

C-3. THE FUTURE NEED FOR FARM LAND

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In planning for a less wasteful and more permanent utilization of the land resources of the nation, it is important to estimate the future need for farm land, particularly for crop land. This future need for farm land depends on the future consumption of farm products and upon production per acre. The prospect for consumption depends, in turn, on the future population of the nation, on consumption per person, and on net exports or imports; while the prospect for production per acre depends on changes in agricultural technique, on changes in the crops or livestock produced, and on changes in soil fertility.

Part I. The Prospect for Consumption of Farm Products

By far the most important factor affecting the consumption of farm products in the future, as in the past, will be, doubtless, the number of people in the nation.

The Population Prospect

U.S. DEPOSITORY

The population of the United States can be predicted for a few decades to come with more certainty than any other factor affecting the future need for farm land, because over 90 percent of the people who will be living in the nation in 1940, and about 75 percent of those who will be living in 1950, are living today; and the number who will die each year can be predicted closely by applying expectation of life tables, such as are used by insurance companies. There is less certainty as to how much longer the decline in number of births will continue and as to whether the restrictions on immigration will be relaxed. However, in view of the fact that it required 50 years to change the attitude of the American people toward immigration, and that there is no suggestion at present of a reversal in this attitude, it seems safe to dismiss this factor of immigration in considering the need for farm land during the next decade or two. A much more important factor is the declining number of births.

The Declining Number of Births. - Since 1921 there have been fewer children born each year in the United States than in the year preceding, with three exceptions. In 1921, the peak year in number of births in the nation's history, nearly 3,000,000 children were born, and in 1933 probably less than 2,300,000. The decline in births has been at the rate of about 60,000 a year, and this decline has persisted in prosperity as well as depression (Figure 1.) In 1933 births were, apparently, fully 100,000 fewer than in 1932. The enrollment in the lower grades of the public schools has begun to decline, and soon this decline will extend into the upper grades.

Many causes have been assigned to the declining birthrate, such as, the disillusionment of the people that followed the world war, in association with the high cost of living in the cities, the widening desire for higher education for the children with associated considerations of prudence, the cravings for luxury, amusements, and social position, which only a rigid restriction on the size of the family can provide in many cases, and, more recently, uncertainty as to one's job or income. Other influences sometimes mentioned include the decline in religious authority and the spread of information as to methods of birth control. But back of it all lies a philosophy of life, and individual judgments as to what is worth while. And back of the philosophy of life lies the constant pressure of an economic system. As with the restrictions on immigration, there are no signs of a reversal

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of the attitude of the American people toward the size of the family, and the only safe assumption seems to be that the birthrate will continue to decline for at least a decade. (Figure 2)

But there are now not enough children being born in the United States to maintain the present population permanently, and only a rise in the birthrate or relaxation of the restrictions on immigration, associated with opportunity for employment, can prevent a declining population as the large number of middle-aged people today, the heritage of the higher birthrate and heavier immigration of the past, grow old and die. We must face the facts in the population situation. The outstanding fact is this, that throughout the European sphere of civilization, the birthrate is declining rapidly. Scarcely less significant is the fact that in Great Britain, France, Belgium, Germany, Austria, and the Scandinavian nations, as well as in the United States, there are now not enough children being born to maintain permanently their present populations. (Figure 3)

In Italy, Spain, Eastern Europe and Russia there is still a large excess of births over the number necessary to maintain population stationary, but in these countries also the trend of the birthrate is downward. In Japan, the declining birthrate, particularly in the cities, suggests that a stationary population will be reached within 30 years. ^{1/} But in India, despite the abject poverty, population continues to increase at an amazing rate; while in China the increase is prevented only by the wars, famines, and pestilences that Malthus described.

Reproduction, Rural and Urban - It appears that our modern urban industrial and commercial system, with its economic and social corollaries, now tends to reduce the birthrate below the level of population maintenance as universally as the self-sufficing agricultural system tends to maintain it above that level. In every state of the United States, without exception, the ratio of children under 5 years of age in 1930 to women 15 to 45 years of age was smaller in the urban population than in the rural; and this is true also of every nation of Europe that collects birth statistics, likewise of Canada, Australia, New Zealand, and Japan. Moreover, in every state in the United States, except New Jersey, the ratio of children to women was lower in the large cities, that is, those over 100,000 population, than in the smaller cities. (Figure 4). In the large cities the number of children is now only two-thirds to three-fourths sufficient to maintain population permanently stationary without accessions from outside; in the smaller cities the deficit is 10 to 15 percent; while in the rural non-farm (mostly village) population there is a 25 to 30 percent surplus, and in the farm population a 40 to 50 percent surplus.

The fundamental cause of this wide difference which has developed between the urban and rural population with reference to reproduction of the race is, in my opinion, that agriculture is a family affair, whereas in urban industry and commerce the individual is the economic unit. In agriculture the wife is almost essential to success. The children can help with the work, with benefit usually to their health and character, and perhaps almost pay their way from 10 years of age onward; and even the aged find something to do. In urban industry and commerce, on the other hand, the wife generally is less closely identified with the business enterprise, unless she also is employed outside the home, in which case it is difficult to raise a family. Children are a load to carry in climbing the ladder of success--it costs probably three times as much to raise and educate a child in the city as it does on the farm--and there is little for the aged to do. The social code, if such it may be called, which is characteristic of the people in the cities within the European sphere of civilization, and which grows out of the economic system, is unquestionably promoting depopulation.

^{1/} See Uyea, Teijiro, - "Future of the Japanese population" published by Institute of Pacific Relations, New York, 1933.

Will the Birthrate Rise? - Because this social code is based on the economic system, and because the ideals, habits and customs of a people change slowly, it seems unlikely that the birthrate will rise in time to prevent a decrease in population in North America and the nations of northwestern Europe. And this decrease in population will be rapid, if the birthrate continues to decline, unless there is heavy immigration from southern or eastern Europe or the Orient. There are now about 9 percent fewer children under 5 years of age in the United States, and 7 percent fewer 5 to 10 years of age, than when the census was taken in 1930 and it is possible, if not probable, that by 1940 there will be 20 percent fewer children under 10 years of age than in 1930. This means fewer marriages a quarter century hence, and correspondingly fewer children in the second generation, if present attitudes persist. A change in ideals is essential if modern civilization is to avoid a decline in population that will be rapid, persistent and progressive.

The Population Prospect. - However, the population of the United States will continue to increase for at least 10 years, probably 20 years, possibly 30 years, principally because the large number of middle-aged people must first grow old and die. By 1940 there will be almost certainly 7,000,000, possibly 9,000,000, more people in the United States than there were in 1930, and between 1940 and 1950 there may be a further gain of 3,000,000 to 5,000,000. Soon after 1950, possibly before, the prospect is that population will become stationary, and by 1960 it will have started to decline. (Figure 5.) We must look forward to an increase of population between now and the peak year considerably less than that which has occurred since the world war, and then a decrease which will accelerate at about the same rate as the present increase, reversed as to time, unless the birthrate rises, or immigration increases greatly. By 1975, or, perhaps, a decade earlier, the population of the nation may have fallen to or below the present level. For a third to a half century to come, therefore, the population of the nation seems likely to remain within 10 or 12 percent of what it is at present. This may be compared with an increase of 16 percent between 1920 and 1930.

But although the total population of the nation may not change greatly for a third to half a century, there will be great changes in the number of children and of old people, and there may be great changes in the number of people living in rural and in urban territory.

At three acres of crop land harvested per person, practically the figure shown by the census of 1930, the nation will need by 1940 about 25,000,000 more acres of harvested crops than were reported by the census of 1930; and when the peak of population is reached, probably soon after 1950, about 35,000,000 acres more than in 1930 would be needed, other factors remaining unchanged. Let us consider, therefore, the prospect for change in the next most important factor affecting the consumption of farm products, namely, the change in diet and in per capita consumption of cotton, flaxseed, tobacco, and other non-food products.

Consumption per Person

The need for farm land is greatly affected by the diet of a people. In the United States it requires nearly 2½ acres of crops to feed the average person and about 6 acres of pasture, much of which, however, in the arid West is of low productivity. In Germany it requires only about an acre of crop land and half an acre of pasture to feed the average person, in China only half an acre of crop land and practically no pasture, and in Japan only a quarter acre of crop land. The acre-yields of the crops are higher in Germany and Japan, possibly in China also, than in the United States; but the major cause of this difference in area required to feed a person is diet.

The difference is still more extreme if the various foodstuffs be considered. If it were possible for a man to live on sugar alone only a third of an acre, at the average acre-yields in the United States, would be sufficient to feed a person for a year (provide enough calories). Of corn or rice about $3/4$ acre would be needed, and of wheat $1\frac{1}{2}$ acre. (Figure 5.) But when the corn is converted into pork and lard, it requires, as you know, about 8 bushels of corn to produce 100 pounds of hog, live weight; and the hog dresses out only about $3/4$ edible products; consequently over 3 acres of crop land plus a little pasturage are required to produce the equivalent food (calory) value in pork. The dairy cow is even more economical than the hog in use of crop area required to produce human food, about $2\text{-}1/3$ acres, but requires much more pasturage, (nearly $1\text{-}2/3$ acres). To produce beef of equivalent food (calory) value, however, requires over 11 acres of crops and about $2\frac{1}{2}$ acres of pasture. It is clear that a large shift in diet from the cereals toward animal products would involve a great increase in need for farm land. (Figure 6.)

Changes in Diet. - The diet of the American people was not changing very much prior to the world war, according to the meager statistical evidence available. There was the 15 to 17 year cycle in the production and consumption of beef, and there was an upward trend in the use of sugar. But the restrictions during the world war, supplemented by the prohibition amendment to the constitution, the higher wages in the cities and other factors, produced notable changes in the diet. During the days of the food administration the per capita consumption of wheat flour dropped about 15 percent below the pre-war level, and has remained more or less constant since. (Figure 6.) This is just about the average percentage of the wheat crop that has been exported in recent years, prior to last year. The use of corn and rye for human food fell much more, perhaps 50 percent, during the war years and those that immediately followed. Millions of people moved from the rural South to Northern cities, where it was not convenient to have corn bread, and millions more in the South could afford white bread, prior to the depression, for the price of cotton kept rather high. The decrease in use of rye bread may have been owing in part to the decreased consumption of beer.

Simultaneously, the per capita consumption of sugar and milk, including dairy products, increased. The use of sugar rose very rapidly to a point about a third above the pre-war per capita level by 1924, and then remained almost stationary till 1930. The consumption of milk per person rose more slowly but more steadily, until by 1931 it was also probably about a third above the pre-war level. The per capita consumption of sugar declined slightly in 1931, and milk followed in 1932. It was the rapidly increasing consumption of milk and dairy products prior to the depression that saved the farmers of the dairy states from the severity of the price decline that set in in the corn belt in 1921 and afterward in the cotton belt also. This great increase in use of milk and dairy products can be attributed in part to the fact that the dairy lunch and the ice cream stand took the place of the saloon in the cities to a large extent, and in part to the scientific discoveries of the vitamin and mineral values of milk. This information as to the extraordinary food value of milk was disseminated throughout the nation not only in newspaper advertisements but also in the women's magazines, many of the articles for which were written by teachers of home economics in our state universities. Probably also the larger income of city people prior to 1930 promoted a greater use of milk. It is remarkable that the consumption of milk held up so well in 1931 and 1932. But the return of beer has brought a new factor, the importance of which cannot yet be evaluated.

Turning to the meats, we find that changes in meat consumption in this country reflect the changes in livestock slaughter, and that the changes in slaughter are the result in large part of the livestock production cycles. 2/

2/ This discussion of changes in consumption of meat was prepared by C. A. Burmeister, of the Bureau of Agricultural Economics.

The period from 1912 to the end of 1917 was an upward phase in a cattle production cycle, and this unswing in production was reflected in increasing slaughter of cattle from 1914 to 1918. A large part of this supply of beef was sent abroad for the use of the allied armies during the world war, consequently the increase in the per capita consumption in this country during that period was not so great as the increase in cattle production and slaughter.

The rapid decline in cattle prices after 1920 caused cattlemen at first to hold cattle off the market and this resulted in a sharp reduction in cattle slaughter and in beef consumption in 1921, but from 1922 to 1926, inclusive, cattlemen were forced to liquidate part of their herds and the per capita consumption of beef increased, reaching its post-war peak in 1926. Reduced slaughter supplies in 1927 caused cattle prices to advance, and these higher prices caused producers to hold cattle off the market and build up their herds, thus resulting in a further decline in beef consumption until the end of 1932. The per capita consumption in 1932 was the smallest in the 34 years for which records have been compiled and was 25 percent less than that in 1926, the peak year of the post-war period.

Early in 1933, the increase in cattle numbers that had been under way since 1928 began to be reflected in increased supplies for slaughter, and as a result the per capita consumption of beef last year was about 10 percent greater than the record low of the previous year. Consumption is expected to continue upward during the next three or four years as a result of the expansion in cattle numbers that has taken place since 1928, but when the downward phase of the cattle production cycle gets under way it will be followed soon afterwards by a similar decline in beef consumption.

The hog production cycle is of much shorter duration than the cattle cycle, averaging only 3 to 5 years in length, whereas the cattle cycle extends over a period of 14 to 16 years. Because of the short duration of the hog cycle, the per capita consumption of pork and lard fluctuates much more than that of other meats. Since hogs can be produced more cheaply than cattle and sheep, especially on farms suitable for feed-grain production, there has been a very pronounced upward trend in hog production in this country for many years, and this has been reflected in a rising trend in the per capita consumption of hog products. During the war period a considerable proportion of the pork and lard produced, like that of beef, was sent abroad for the use of the Allied forces and this tended to reduce considerably the amount of pork and lard for home use in that period.

After 1919, exports of pork declined sharply, notwithstanding that hog slaughter from 1919 to 1923 increased nearly 23 percent. This greatly increased the supply of pork and lard for domestic use. The per capita consumption of these products increased to a record total in 1923 and continued at a high level in 1924. These large supplies made hog production relatively unprofitable, consequently, there was a reduction in hog slaughter in 1925 and 1926 and reduced consumption of hog products. Slaughter again increased in 1928 and 1929, and, with a further decline in exports, the supply of pork and lard for domestic use was expanded. This was followed by reduced supplies in 1930, 1931, and 1932; but in 1933 hog production once more turned upward. Part of the increased supply of hog products in 1933 was exported, but most of it went into storage and was carried over into 1934, consequently the per capita consumption of hog products in 1933 was not greatly different from that of 1932.

Production of lamb and mutton (mostly lamb) was greatly expanded after the war period, the increase in slaughter from 1922 to 1931 amounting to more than 50 percent. Practically all this production is consumed in the domestic market, and as a result of the increase in the available supply the per capita consumption of lamb during the last three years has been near record levels. The total of about 7 pounds per capita, however, is equal to only about one-seventh of that of beef and about one-tenth that of pork. Veal consumption is about equal to that of lamb and tends to fluctuate somewhat with that of beef.

Total per capita consumption of all meats, excluding poultry, in 1933 was 4 to 5 percent greater than that in 1932, with most of the increase being in beef and veal. Consumption per capita of meat apparently has increased each year during the depression, but the increase was very small prior to 1933. Prices were so low that the people were able to maintain their high standard of living in this respect. The consumption of eggs per capita increased from 1925 to 1931, but declined in 1932 and again in 1933.

Turning to the vegetables and fruits, there was a notable increase during and after the world war in use of the green vegetables, particularly in the cities. The carlot shipment of vegetables increased 50 percent between 1920 and 1930, as compared with 27 percent increase in the urban population. For lettuce and spinach the increase was over 250 percent, for carrots and string beans 500 percent. On the other hand, the per capita consumption of white potatoes has been trending slowly downward for a third of a century. Taking the fruits as a whole the trend in per capita consumption has, apparently, remained almost horizontal for 30 years at least, the increasing use of citrus fruits and grapes (prior to the depression) counterbalancing the decreasing consumption per person of apples.

Combining the quantities of various foodstuffs on the basis of the average farm price during the decade 1917-1926, it appears that from 1923 to 1928, when the cities were prosperous, the level of per capita consumption ranged from 4 to 8 percent above the level just before the world war, but by 1930 the value of the diet, so measured, had fallen to the pre-war level. (See Figure 7, heavy line) In 1933 it appears very probable that it rose again above the pre-war level, the increased consumption of meat more than balancing the slightly decreased consumption of milk, as compared with 1932.

The outstanding fact in the development of the American diet since the beginning of the twentieth century, which is as far back as statistical data permit safe conclusions, is the shift from the cereals toward the more expensive animal foods, particularly from corn and wheat toward milk and poultry products and pork. In addition, there was the notable increase in consumption of sugar after the prohibition amendment went into effect and the greater use, at least in the cities, of green vegetables. These shifts in diet have had profound regional influences. The 30 percent increase, more or less, in per capita consumption of milk and dairy products, for example, has promoted the prosperity of the dairy states.

Changes in Consumption of Non-food Products. - Turning to the non-food products we find that the per capita consumption of cotton in the United States remained remarkably uniform for 30 years prior to the depression at about 25 pounds. Increasing industrial use counterbalanced the declining use for clothing. By the year 1931 - '32, August to August, consumption of cotton per person had fallen to 18 pounds, but during the past year, 1932 - '33, it rose to 23 pounds, or almost back to the predepression level. However, this decline in consumption for a few years was sufficient to build up a large surplus of stocks, which exerted a very depressing influence on the price of cotton. The per capita consumption of tobacco increased somewhat from the beginning of the century to the beginning of the World War, increased rapidly during the War, and remained more or less constant

afterward until 1929. Since 1930 consumption has decreased notably. The per capita consumption of flaxseed, used mostly to produce linseed oil, rose rapidly from 1918 to 1924, then remained fairly steady until 1928. During the depression consumption has fallen to about half.

Diets and Land Requirements. - Viewing the first third of the twentieth century the outstanding fact is that, although great changes occurred in the use of certain products, particularly since the world war, the per capita consumption of farm products, taken as a whole, has remained remarkably constant. At no time has the aggregate consumption per person of the foodstuffs risen more than 8 percent above or fallen more than 7 percent below the level at the beginning of the century. The farmers continue to produce in depression as well as in prosperity, and the people continue to consume. What a calamity it would be if agricultural production had fallen to a minimum of one-half during the depression, as industrial production has done. Millions of people might have perished. Right in this fact lies, in my opinion, a major, possibly the major, explanation of the present low prices for farm products. The city people have been producing only half to three-fourths as much as before the depression, and they have, apparently, been able to offer the farming people only half to three-fourths as much in exchange. The economic breakdown in the cities has been a very important cause of the low prices for farm products. The prices of farm products cannot rise much more rapidly than the income of city peoples without inducing a shift toward the cheaper foods, particularly toward the cereals. And a shift back toward the cereal foods would have a marked effect upon the future need for farm land.

Recently Dr. Stiebeling and Miss Ward, of the Bureau of Home Economics in Washington, made a study of four diets. 3/ The cheapest diet is called the "emergency restricted diet." It consists largely of the cereals, and it would require only about 1.2 acres of crop land to produce enough of the foods in this diet to feed the average person for a year. It is an emergency diet, and deficiency diseases might develop within a year. Much better, but more expensive, is the "adequate diet at minimum cost." It includes more meat and milk, more fruit and vegetables, and would require about 1.8 acres per capita to produce. The "adequate diet at moderate cost" provides even less cereals, but increases the supply of milk to a quart per person per day. These experts on nutrition believe that milk is so valuable a food that its use must not be restricted for the sake of economy, except in cases where it is imperative to have a low cost diet. The supply of meats and fruits and vegetables is further increased in this "adequate diet at moderate cost." It would require about 2.3 acres of crop land per person to produce this diet, which is practically the same as is used in the United States at present. Finally, in the "liberal", or ideal, diet the consumption of cereals per person is reduced to 100 pounds a year, or about half the national average at present, and less than 1/3 pound a day, while milk is kept at a quart, or two pounds a day, the fruits and vegetables are increased to over two pounds a day, and the meats to nearly a half a pound a day. In addition, one egg a day is recommended. If all the people in the nation could afford and would use this "liberal" diet the consumption of milk would be increased over 50 percent, and of meat somewhat less, but the use of wheat flour would be reduced to less than half the present consumption. To produce this diet would require 3.1 acres of crop land as compared with 2.3 acres at present. The "liberal" diet requires two and a half times the acreage required to produce the "emergency restricted diet."

3/ Stiebeling, Hazel K. and Ward, Medora M., "Diets at Four Levels of Nutritive Content and Cost," Circular 296, U.S. Dept. of Agriculture, 1933.

Should the people in the cities find it necessary to retreat from their present fairly high standard of living with reference to diet, the effect upon the amount of farm land needed would be profound. On the other hand, if those among the farming people of the South who live largely on "hog, hominy and hoe cake", to use a common phrase, and others among the people of the Appalachian Mountain region and the even more numerous poorly nourished people in the cities could have the food they need, particularly the milk and meat and eggs, the fruits and vegetables, there would be a great increase in the need for farm land. So long as pellagra, rickets and other deficiency diseases are common in the United States, we regret to speak of an agricultural "surplus". Let us hope that urban industry and commerce can be so organized, and agriculture in the various regions can be so adjusted, that these literally half-starved people, who are living their lives on a low plane of efficiency and achievement, can earn enough and learn enough to procure those foods they greatly need. It is my opinion that there are millions of people in the United States who need better food more than they need any manufactured commodity.

Population Changes, and Occupation Changes in Relation to Commercial Demand for Foodstuffs. - But whether these people will obtain the food they need only the future can reveal. And the future is uncertain, particularly with reference to the economic organization of society, the distribution of wealth, and the standard of living. Yet there are some things that will materially affect the consumption of farm products of which we can be practically certain, and some things that are not certain nevertheless deserve consideration. We will note only two of these prospective changes - those that will occur in age, and those that may occur in occupation of the people.

It is practically certain that about twenty-five years hence there will be twice as many old people in the nation as there are today. (Figure 8.) The number of persons over 65 years of age increased 34 percent between 1920 and 1930 in the nation as a whole and 50 percent in the urban population. We can be almost as sure that there will be fewer children. The number of children under 5 years of age decreased slightly between 1920 and 1930, and it is certain that there will be 10 to 12 percent less in 1935 than in 1930. There may be 20 to 25 percent less by 1940. Probably - unfortunately there are few statistics on the subject - children drink more milk than old people. Twenty percent fewer young children in 1940 than in 1930, and still fewer in 1950, is a possibility that needs to be considered by the dairy industry. There are doubtless other foods than milk the consumption of which will be affected by the aging of the population.

Quite uncertain, on the other hand, is the prospect for change in the occupation of the people, with resultant effect upon the market for farm products. According to the census of 1870 about 53 percent of all persons gainfully employed were engaged in agriculture. By 1930 this proportion had fallen to 21 percent. (Figure 9.) Agricultural production per person engaged increased, apparently, about two and a half fold in the 60 years. After 1920 the proportion engaged in manufacturing and mechanical pursuits and in mining also declined, despite a great increase in production. Those not needed in basic production have resorted mostly to trade and transportation and to personal and professional services. The proportion of the population engaged in trade and commerce doubled between 1910 and 1930. It is very doubtful if services rendered doubled in these 20 years. Apparently efficiency declined.

There are signs that the costs of distribution are becoming greater than the traffic will bear, and the unemployment situation suggests that the proportion of the population engaged in agriculture and some of the other basic industries may increase. Not that these people will be needed for commercial production, for

half the farmers in 1929 produced about 88 percent of all farm products "sold or traded" (to use the census phrase), and this half of the farmers could readily raise the other 12 percent. But continued inability to obtain employment in the cities may lead to more full-time or part-time farmers. The farm population is now the highest in the nation's history and young people are being backed up on farms at the rate of nearly a million a year. The greatest uncertainty in estimating the future need for farm land is the future direction of internal migration. Will the surplus young people on the farms go to the cities, to the villages, with much part-time farming, or to other farms?

I hope the major movement will not be to the cities for three reasons: First, it will tend to hasten the decline in the national population; second, the more ambitious and better educated youth tend to leave for the cities from the poorer farming areas particularly, and this probably tends toward deterioration of the quality of the people; third, because migration to the cities involves a great movement of rural wealth cityward.

Rural-Urban Migration and Some Consequences. - Between 1920 and 1930 the urban population increased 14,650,000, or 27 percent. About 6,000,000 of this increase consisted of migrants from the farms, mostly young people, about 3,000,000 more were immigrants from foreign countries, and probably less than 6,000,000 were the excess of births over deaths in the cities. The city people needed to bear the cost of feeding, clothing and educating only about 40 percent of the young people who began work in their factories, offices and stores between 1920 and 1930; fully 60 percent were provided, almost free of cost, by the farm and village people of the United States and by foreign countries. (Figure 10 & 11.)

This morning, as I came across central Iowa I could not but observe the character of the farm houses. There were some splendid houses and large barns, but, in general, the houses were neither as large nor of as good architecture as the farm houses of New England and New York State, Eastern Pennsylvania and Maryland, where the farms are smaller and the soil is poorer. Many of these houses in New England and New York were built out of stony, hillside farms more than a century ago, when most cows gave only 1,000 to 2,000 pounds of milk a year, as compared with 4,000 to 6,000 pounds today, when artificial fertilizers were unknown, and when the grain was seeded broadcast, harvested with a sickle or scythe, and threshed with a flail. These New England, New York, and Pennsylvania houses were well built, for many of them are almost as good now as a century ago, and the architecture is excellent. There is unmistakable evidence that the people who built these houses possessed wealth and culture, and it is clear that in most cases this wealth came out of the land.

If it were possible to develop such a rural civilization at a time when hand labor and poor livestock were characteristic of agriculture, why is it not possible to do so today when the farmer has all the panoply of modern science and invention to aid him in his work? The reason resides, in my opinion, largely in the movement of rural wealth to the cities.

If it costs \$2,000 to \$2,500 (at predepression prices) to rear and educate the average child on American farms to the age of 15, when he may be assumed to be self-supporting, - and \$150 a year does not seem an excessive estimate of the cost of food, clothing, medical services, education, and all the incidental expenses, - then the 6,300,000 net migration from the farms during the decade 1920 - 1929 represents a contribution of about \$14,000,000,000. This is almost equal to the value of the wheat crops plus half that of the cotton crops during these years.

Nor is this all. When the farmer and his wife grow old and die the estate is divided among the children. During the decade 1920 - 1930 about one-fifth of the farmers and their wives died, and these estates were distributed among the children. About one-third of the children had moved to town, and those children who remained on the farm had to mortgage the farm in many cases in order to pay the brothers and sisters who lived in the cities their share of the estate. A rough estimate indicates that between \$3,000,000,000 and \$4,000,000,000 was drained from the farms to the cities and villages during the decade 1920 - 1929 incident to the settlement of estates.

Although it is not intended to draw up a balance sheet of rural-urban contributions, it is worthy of note that there are great movements of farm wealth to the cities in addition to those incident to migration. Interest on debt paid to persons other than farm operators amounted to about \$7,500,000,000 during the decade 1920 - 1929, while rent paid to persons other than farm operators amounted to about \$10,500,000,000. ^{4/} These payments are of a different character from the movement of wealth incident to migration, but there can be little doubt that portions of these payments were for the use of capital that had previously been transferred to the cities as a consequence of migration. The total movement from these four sources appears to have been about \$35,000,000,000 during the decade, or \$3,500,000,000 a year, which was about one-third of the average annual gross income of all farmers during the decade.

During the depression there has been a migration back to the farms. In 1930, the movement to and from farms almost balanced. In 1931 the net movement to farms was over 200,000 and in 1932 it was over 500,000. Estimates for 1933 have not yet been made. ^{5/} The excess of births over deaths on farms is nearly 500,000 annually, and the farm population is now probably 2,000,000 greater than it was when the depression began. In several cities, on the other hand, deaths now exceed births, and migration from the cities has, therefore, meant a decrease in population. Professor Whelpton, of the Scripps Foundation for Research in Population Problems, estimated a year ago that the urban population of the Nation decreased a half million during 1932. It is possible a decrease occurred also during 1933. In New York City, for example, the deaths in 1932 of people over 40 years of age were about 20 percent more numerous than in the years just preceding the depression, which is about the percentage increase to be expected in numbers of old people. But the deaths of people under 40 years of age in New York City declined about 20 percent. Evidently as many young people were not there to die - many thousands had gone back to the villages and the farms. People under 40 were nearly two and one-half times more numerous in New York City in 1930 than people over 40. Even after allowance is made for the lessened death rate among young people, this decline in deaths of persons under 40 years old strongly suggests a notable decrease in the population of that city, - possibly a half million between 1928 and 1933.

^{4/}See "Crops and Markets" of Bureau of Agricultural Economics, November 1932, page 440, and July, 1927, page 254.

^{5/} The Bureau of Agricultural Economics issued in March 1934 an estimate that the new movement from the farms to the cities, amounting to about 227,000, was resumed in 1933. This was primarily the result of a great decrease in the movement from the cities to the farms. In addition, there was a small increase in the movement from the farms to the cities, - largely emigres returning to their old jobs, to Civil Works positions, or to obtain emergency relief.

How much longer this situation will persist no one knows, but it would be well for farmers to realize that between 1930 and 1940 the urban population of the nation is not likely to increase more than half as much as it did between 1920 and 1930, and that it is very likely the population of many cities will decline. Unless foreign trade revives to an extent approaching its pre-depression magnitude, it is difficult for me to see how the former population of the large Atlantic coast cities could be supported at the same standard of living as before the depression. Should the population of the cities decline before that of the nation as a whole, and if consumption of farm products per capita does not increase, the domestic commercial demand for farm products doubtless will decline before the population of the nation starts downward. Moreover, the subsistence homestead movement, which was making rapid progress even before the law containing this phrase was passed, suggests that many people may begin raising a part of their food supply, while those who now raise a part may raise more.

The farmers of the nation appear to be faced with these alternatives in domestic demand for farm products:

1. If migration to the cities is resumed, the approach of a stationary and later declining population will be accelerated, for the farm population will be depleted of its potential parents, and these migrants to the cities will have probably only half to two-thirds as many children as they would on farms. Temporarily the demand for farm products will increase, but after a decade or two it is likely to diminish.
2. If migration to the cities is not resumed, a larger proportion of the population will raise a part or all of the farm products they desire. This will tend to lessen temporarily the commercial demand for farm products, but the long-time demand appears likely to be better maintained than under the condition of continued migration to the cities.

Let us consider, therefore, the third major factor affecting the future consumption of farm products, namely, exports.

The Prospect for Exports of Farm Products 1/

The United States has three major agricultural regions peculiarly fitted by climate, soil, and the lay of the land for the production of a surplus of a certain farm product - cotton from the cotton belt, wheat from the wheat belt, and corn or animal products from the corn belt. The advantages of the cotton and corn belts are unique, and even the wheat belt has certain advantages over other wheat belts of the world. It was the farm products from these great surplus - producing regions that were used to pay back the money the American people borrowed from Europe to build railroads and make other internal improvements in years past; and later, after the debts were paid, led to great credits to Europe, which Europe is finding it difficult to repay. It is in these surplus regions, where commercial agriculture is dominant, that the decline in prices of farm products has had such devastating effects. I shall consider briefly the situation relative to exports of the characteristic commodities from these belts

1/ Since this address was given official measures have been set in motion looking toward the increase of our exports. This discussion does not include consideration of them or their probable effects.

and make such deductions as seem justified to me as a student of these matters.

Cotton - The American cotton belt and China are the only large areas outside of the tropics which possess both temperature and rainfall conditions suitable for the production of cotton, and China imports large quantities of American cotton. In the river bottoms and in the western portion of the cotton belt the soil is fertile, and in the eastern portion the normally high value of the crop permits the practically universal use of fertilizers. Moreover, the cotton belt possesses a large supply of cheap labor peculiarly adapted to the simple culture of this crop, and, in addition, the people of the south during a hundred years have accumulated a vast fund of experience and skill in the production and marketing of the crop.

More than half the cotton of the world is grown in the cotton belt, and this region is holding its own in the world's markets. The exports of cotton from the United States constituted a larger proportion of the exports from all cotton producing countries during the fiscal years 1931 - 32, also during 1932-33, than before the depression, and as large a proportion as during the 5 years preceding the world war. Indeed, the exports in the past two years were larger than in any previous years in the nation's history, except the crop years 1910, 1911, 1912, 1926, possibly, one or two other years. These foreign markets for cotton have not been restricted by tariffs or quotas, as has occurred with wheat, for the nations that import most of the American cotton do not grow the crop, with the exception of China. Nor has any Imperial preference been extended in the case of cotton by Great Britain, doubtless in part because the granting of such a favor to her dominions or colonies would become a handicap in competing with other cotton manufacturing nations in the sale of goods on the world's markets. Exports of cotton from the United States constitute now about three-fourths of the value of all agricultural exports.

The great uncertainty in the cotton belt is the perfection of a cotton picker. If such a machine became widely used it would, no doubt, lower the cost of production, and this would be an advantage in world competition. This advantage probably could be maintained, for the principal competing countries are Egypt, India and China, where the use of modern machinery is not profitable because of the very low price of labor. But a cotton picker would give an advantage, within the cotton belt, to areas of level land, and to those where the management of the land could be readily consolidated into large units. The mechanization of cotton production would be likely to lead to notable regional shifts in production, and to serious social problems, as well as to raise new problems of land utilization.

Wheat - The wheat regions of the Northwest and the Southwest likewise have advantage in climate or soil conditions over most other wheat exporting regions of the world, but they also have economic disadvantages. The natural advantages are less frequency of frost than the prairie provinces of Canada, less danger of drought than in most of southern Russia and of Australia. But in much of Argentina and of the Danube Valley climatic conditions are probably as favorable as in the United States. The disadvantages of the wheat belt of the United States are generally higher taxation, higher wage rates, and higher transportation costs to tidewater, with the possible exception of the Canadian region.

But these natural and economic factors, which in the past tended to balance, so that all these countries continued to export their surplus of wheat, have now been eclipsed by political factors. Tariffs, quotas or other restrictions have been placed upon imports of wheat by practically every European country, and in several countries these regulations have been supplemented by governmental aids to the wheat industry. Because of these barriers, and because of the higher prices for wheat in the United States than in other exporting countries, the exports of wheat have sunk to an insignificant figure. During the past year exports have been almost entirely from the Pacific Northwest, and these have been made only as a result of special export aid.

Looking to the future, it is well to recall that the European barriers upon wheat imports have been erected to protect the farmers in these countries, and where the farmers constitute only a minority of the population, the governments are, nevertheless, profoundly concerned over the welfare of the farming class. The peasants are recognized as a bulwark of the State. They are providing far more than their share of the citizens and soldiers of the future, and should war come they must also be depended on to provide the needed food. Moreover, the population of Germany and France will cease to increase probably within a few years, unless Italians and other fecund peoples move into these countries in unprecedented numbers, and in Great Britain a stationary population will be reached in all likelihood within five years. By 1950 the population of Great Britain will have fallen probably a half million below the peak and by 1960 two million or more below. Similar declines may be expected in Germany and France, and later in all the countries of Northwestern Europe, except possibly, in the Netherlands and Denmark. A declining population is likely to mean a declining consumption of wheat unless there is a continued shift from rye to wheat. A development which has occurred in several European countries. Even should nationalistic policies in northwestern Europe be modified gradually, declining population, supplemented probably by advancing agricultural technique, seems likely to diminish the need for imported wheat. Exports of wheat from the United States have been on very low levels during the past two years and the prospect for recovery of the predepression levels is not bright.

Moreover, although the population of the United States will continue to increase for sometime, this increase is likely to be less than 10 percent at the maximum, and there may follow a decline in population. The exports of wheat during the decade prior to the depression ranged from 13 to 37 percent of the production, the lower proportions being in the later years, when population was larger. At the 1925 - '32 level of consumption (disappearance) per person and acre-yields the nation will need for domestic use about 48,000,000 acres of wheat by 1940, and 50,000,000 acres by 1950. In 1931, and also in 1932, about 60,000,000 acres were harvested, but in 1933, a season of severe drought, only 50,000,000 acres. Furthermore, a rise in the quality of the diet, as previously noted, seems likely to result in a smaller per capita consumption of wheat. So long as exports remain at their present low level, there appears likely to be a real and more or less persistent surplus in acreage of wheat, unless measures of control are continued. The problem of shifting from wheat to other uses of the land seems likely to remain acute along the arid margin of the wheat belt particularly.

Corn and Hogs - Let us now turn to the corn belt, - that great food-producing region which extends from central Ohio to western Nebraska, stretching northward into Minnesota and southward across much of Missouri. Nowhere else in the world is there a contiguous area of such magnitude so fertile and so productive of cereals. Corn by nature is a very productive crop, yielding about twice as much food per acre as wheat or oats, and the physical conditions in the

corn belt are peculiarly favorable for the production of corn. The summer rainfall of the humid tropics is combined with a soil whose fertility is locked up by its frozen condition during much of the winter. And not only is there the summer rainfall of the tropics, but also the high summer temperatures, so favorable to the growth of corn. The underlying rock in the eastern portion is limestone in large areas, and limestone characteristically produces a fertile soil; while in the western portion the extensive wind-blown soils derived in large part from the more arid regions to the west, are also generally rich in lime. Moreover, the soils of most of the eastern corn belt were rejuvenated a few thousand years ago by the glaciers that extended far south in this region. These glaciers ground off portions of the underlying rock and brought this unleached material, with its high content of lime, phosphorus, and potash, to the surface. This fertility has been preserved over much of the corn belt by the grass vegetation, for just as forests tend to promote the leaching of the lime, potash and nitrogen out of the soil by the rains, so do grass roots tend to raise these elements of fertility to the surface. Nowhere else than in the central corn belt is a humid climate combined with a grassland soil, except for a small area in Argentina. The United States produces from half to two-thirds of the corn crop of the world, and nearly two-thirds of the corn crop of the United States is produced in the corn belt.

The corn belt has appropriately been called the heart of American agriculture. Into it flow the stocker and feed^{er} cattle from the West for fattening, to supplement its home grown stock, and out of it flow more than two-thirds of the beef and pork consumed in the eastern, northern, and to a lesser extent, southeastern sections of the country. It supplies, moreover, most of the exports of pork and lard, and, in addition, ships corn and hay in vast quantities to the eastern and southern markets. Although the corn belt includes only 8 percent of the land area of the United States, it possesses over a fourth of the cattle, about a third of the horses, and over half of the hogs of the Nation. It has long been the great surplus meat producing region, and has now become a great surplus milk producing region as well.

Of the production of animal products in the corn belt a very rough estimate indicates that eight to ten percent was sent abroad during the 5 years prior to the depression, mostly in the form of pork and lard. In 1932 and 1933 these exports averaged about one-third less. But, as with wheat, tariffs and other restrictions, especially quotas, are interfering with exports of pork and lard. The restrictions have not yet become prohibitive, except in Germany, but the trend is toward higher barriers. Deep concern is felt at present over trends in Great Britain, which is the most important market for American hams and bacon, because of quota restrictions. Exports from the United States at present are restricted to between 7 and 8 percent of the total British imports from foreign sources of supply, which in terms of American production is an insignificant amount. The future of our exports of animal products is uncertain, but the trend is not encouraging.

We should not forget, however, that the population of the nation is still increasing. This increase is very likely to be fully 3 percent, possibly 4 percent by 1940, and perhaps as much more by 1950. If per capita consumption of pork and lard during recent years persists, the present production will be no more than sufficient to supply domestic needs in about a decade. Meanwhile, the decrease in exports of these products is raising serious problems of land utilization in the corn belt. However, some consolation may be found in the fact that a reduction in the acreage of corn, the cultivation of which facilitates erosion, will tend to conserve the fertility of the soil. There is little doubt that in much of the corn belt the proportion of the crop land in

corn is too great from the standpoint of a permanent agriculture.

Considering the net exports of farm products as a whole, it appears that about 44,000,000 acres of crop land are now required to produce these exports, whereas during the five years prior to the depression about 60,000,000 acres were so used. (Figure 12). This includes an allowance of nearly 20 percent for crop feed consumed by horses and mules used in producing the exports. If such by-products as mill feed and cotton seed that remain in the United States are allowed for, these figures should be reduced by about 5,000,000 acres. The lost export market involves the product of about 16,000,000 acres of crop land. However, most of this decline occurred prior to the depression. The decline in acreage required to produce the exports has been only about 10 percent since 1930, and for the fiscal year, 1932-1933, the acreage was about the same as in the previous year. This tapering off in the decline, taken in connection with the fact that cotton now constitutes nearly three-fourths of this acreage, suggests that a new level of exports may be about reached.

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Let us now summarize as to the prospect for consumption of farm products:

1. The population of the nation will increase at least 3,000,000, possibly 5,000,000 by 1940, and as much more, probably, by 1950. This means that, if other factors remained equal, from 9,000,000 to 15,000,000 more acres of crops will be needed by 1940, and 18,000,000 to 30,000,000 acres more by 1950. But other factors may not remain equal. An acreage much greater than this might readily be released by a lowering of the standard of living, and in other ways. On the other hand, the use of more meat and milk in the diet would increase the need for land.
2. But the consumption of farm products per person has changed very little in the aggregate for 30 years, as measured in land requirements; although notable shifts have occurred in diet, and doubtless will continue to occur. In particular, the increase in consumption of beer and decrease in number of children suggests a lesser demand for milk, unless the great value of milk as a food for adults, as well as children, can be further impressed upon the people. But considering the consumption of farm products as a whole, the best guess appears to be that there will be no notable change in the national per capita acreage requirement.
3. For exports, likewise, it now seems probably that there will be no notable further change in aggregate acreage required for their production. But the decline in exports of wheat and pork products suggests the need for a permanent contraction in wheat acreage and for a shift temporarily of several million acres from corn to other crops or pasturage.

However, before reaching a definite conclusion in this matter of adjustments in acreage of wheat and corn, or that the increase of population will require a few more million acres of crops by 1940 and still more by 1950, it is necessary to consider the prospect for agricultural production per acre. Without any increase in acreage or acre-yields of the crops agricultural production increased about 20 percent during the decade preceding the economic depression. This great increase in production per acre was owing largely to changes in agricultural technique, and shifts in the relative importance of the crops and livestock. These production factors, also the decline in the soil resources of the nation, we will consider this afternoon.

PART II. THE PROSPECT FOR AGRICULTURAL PRODUCTION

May I call your attention to Figure 13. It shows the percentage change since the beginning of the century (1) in the population of the nation, (2) in agricultural production, (3) in acreage of the crops harvested, and (4) in quantity of labor employed in agriculture. Population has increased about two-thirds since the beginning of the century, agricultural production about one-half, crop acreage about one-quarter, and total labor in agriculture about one-tenth. Although population has increased more than agricultural production, consumption of farm products per person has not declined, because more of the production is consumed at home and less is exported abroad. At the beginning of the century the farm products exported required for their production nearly one-fourth of the total crop acreage, whereas during the last five years only about one-eighth has been required.

But it is not this relation of agricultural production to population that we wish to consider this afternoon. We discussed this relation briefly this morning. Instead, let us consider the relation of agricultural production to crop acreage, also the relation of the future need for farm land to the national program of land utilization that is now developing.

Agricultural Production Per Acre

You will note in the graph that the line representing agricultural production and that representing crop acreage did not get far apart until after the world war. Comparing the average production during the period 1917-1921, inclusive, with that during the period 1927-1931, it appears that the increase during the decade was about 20 percent. This increase occurred despite a stationary acreage of the crops. Moreover, the yields per acre of the crops, taken as a whole, remained stationary or declined slightly. How was it possible to have a 20 percent increase in agricultural production, despite a stationary crop acreage and a stationary or slightly declining acre-yield? If length and breadth and height remained the same, how could there be an increase in volume? It is because agriculture, like modern physics, has a fourth dimension, indeed, it has a fifth, a sixth and a seventh dimension.

Factors Affecting Production Per Acre

The increase in agricultural production per acre since the world war is owing almost wholly to four factors, which were of scarcely any importance in pre-war years.

Decline in Horses and Mules - The most important of these factors has been the substitution of gasoline for horse feed. There are two final consumers, so to speak, of farm products, - human beings and horses or mules. All other consumers, such as cattle, swine, sheep and chickens, are intermediate to human consumption. At the close of the world war there were about 29,000,000 horses and mules in the United States, including over 2,000,000 in cities. These horses and mules consumed the products of about 90,000,000 acres of crop land, besides much pasture. On January 1, 1934, there were only about 17,000,000 horses and mules in the nation. This decrease of 12,000,000 horses and mules has released the products of about 37,000,000 acres of crop land. Moreover, the decrease in horses and mules was greatest in the richest agricultural regions, notably in the corn belt and in the southern portion of the hay and dairy region. (Figure 14). Most of these 37,000,000 acres, more or less, are now being used for the production of meat and milk.

This release of land for other uses must continue for several years at least, because the number of colts born in recent years is only about half sufficient to replace the horses and mules that are dying annually. However, interest in raising colts is increasing. The number of horse colts born in 1933 was about 16 percent larger than in 1932, and of mule colts about 10 percent larger. When births of colts will equal deaths of horses and mules no one can foresee, but it seems unlikely to occur before 1940. Moreover, it is well to recall that improvements in tractors and tractor machinery will almost certainly continue to be made, whereas improvements in horses and mules as sources of power will make slow or no progress. The use of the Diesel engine in tractors gives promise of reducing the cost of operation, while the placing of pneumatic tires on tractors has apparently increased their efficiency as well as the comfort of operation. Furthermore, if the attitude of young people at present is indicative of what it will be in later life, it appears that comfort and speed will be esteemed fully as much as economy. By 1940 it appears probable that between 5,000,000 and 10,000,000 acres more of crop land will be released for other uses by the decline in horses and mules.

Shifts from the Less Productive to the More Productive Crops per Acre - The second most important factor, apparently, in causing an increased production on a stationary crop acreage was the shift from the less productive to the more productive crops per acre, notably from corn to cotton in the South prior to the depression, from wheat toward corn in southern Minnesota, the Dakotas and eastern Kansas, and from grain and hay to fruits and vegetables in California and elsewhere. Apparently this shift resulted in increasing crop production by the equivalent of about 14,000,000 acres of crop land.

During the depression the trend of cotton acreage has been downward, while that of corn in most of the cotton belt has been upward. This trend in cotton has now been accelerated by the AAA control program. Likewise in the wheat belt, the trend of acreage has been downward, and probably more wheat land has reverted to pasture or lies idle than has been put into corn or other productive crops. This trend also has been accelerated by the governmental control program. In the corn belt the acreage of corn reached a maximum in 1932 and declined in 1933. The corn and hog program will almost certainly cause a further decline in 1934.

It is interesting to note that shifting the use of land from the more productive crops to the less productive pasture or cover crops has been the principal means adopted by the Agricultural Adjustment Administration in restricting production. For this reason it is difficult to forecast the future with reference to the influence of this factor upon agricultural production per acre. In 1934, however, the 14,000,000 acres, more or less, that were gained during the decade following the world war will undoubtedly be lost, and, perhaps, as much more. It is my opinion that this is a trend which should be encouraged. In particular, cultivated fields that are eroding badly should be put into pasture or forest. But to do this will in many cases involve purchase by or other assistance from the government.

Shifts from the Less Productive to the More Productive Classes of Farm Animals per Unit of Feed Consumed - Likewise there was a shift during the period between the world war and the economic depression from the less productive classes of food-producing animals toward the more productive classes, principally from beef cattle toward dairy cattle, hogs and poultry (Figure 15). The graph used this morning, you will recall, indicated that it requires the products of over 11 acres of crop land, besides much pasture, fed to beef cattle to produce as much human food, measured in calories, as 2-1/3 acres

of crop land and 1-2/3 acres of pasture used to feed dairy cows, or 3.1 acres of crop land used to feed hogs. You will also recall that the consumption of beef per person declined after the world war, and was only about 80 percent of the prewar level during the years 1928 to 1932, while the per capita consumption of pork rose 15 to 20 percent above the prewar level, and of milk slowly increased to about 30 percent above that level by 1931. This shift toward the more productive classes of farm animals per unit of feed consumed was equivalent, apparently, to the production of about 9,000,000 acres of crop land.

The future influence of this factor of shifts in relative importance of the animal products is also difficult to forecast, for it depends largely on changes that may occur in the diet of the people. However, it should be noted that we appear to be one year along in the upward trend of the beef consumption cycle, while consumption of milk per capita has declined, probably owing in part to the increasing use of beer. This situation suggests a reversal in the influence of this factor, so far as cattle are concerned.

Increased Production of Meat and Milk per Unit of Feed Consumed Within Each Class of Farm Animals - Lastly there remains to be noted the improvements that have occurred in the efficiency of use of feed, particularly by dairy cows, by hogs, and by poultry. Since the world war there has been an increase, apparently, in production of milk per cow approaching 20 percent. The better cows eat more, but it is doubtful if they eat 12 percent more, on the average. The cow testing associations are, apparently, attaining their objectives. Likewise with hogs, during the past four years the estimated number of hogs on farms January 1st averaged about 7 percent less than during the four years following the world war, whereas the production of pork and lard was nearly 20 percent greater. Better sanitation is resulting in larger litters being raised and the feed formerly lost in the dead pigs now goes to market in live hogs. Improvements in feeding practices, particularly the use of minerals and legumes, has also resulted in economy in use of feed. It may be roughly estimated that the equivalent of at least 5,000,000 acres of crop land were contributed to agricultural production since the world war by improvements in animal husbandry.

Here again it is hazardous to forecast the future, but it is perfectly safe to say that there is a wide margin remaining for further improvement. Cow testing association records indicate that the greatest production of milk per unit of feed consumed is attained in herds averaging 10,000 and 12,000 pounds of milk yearly per cow. Even at the rapid rate of increase in production per cow since the world war, it will require nearly a century to attain a level of 10,000 pounds per cow.

The Four Factors Considered as a Whole - These four means of increasing agricultural production, - substitution of gasoline for horse feed, shifts from the less productive to the more productive crops per acre, shifts from the less productive to the more productive animals per unit of feed consumed, and, finally, increasing efficiency in use of feed by each class of farm animals, achieved principally by breeding and selection - increased agricultural production by the equivalent of about 50,000,000 acres during the decade following the world war. Adding the 16,000,000 acres, more or less, released for home consumption by the decline in exports, it appears that the increase of farm products thus made available for domestic consumption was equivalent to the production of about 66,000,000 acres of crop land. On the other side of the ledger there is, first, the increase in population of 17,000,000, with a consequent increase in need for crop land of 50,000,000 acres; secondly, the improvement in diet, notably more milk and pork, that required the products of about 13,000,000 more acres than would have been required by the prewar diet; and, thirdly, a slight decrease in acre-yields of the crops.

Looking to the future, it seems reasonable to expect that at least 5,000,000 acres more will be released before 1940 by the further decline in horses and mules, and presumably the improvements in animal husbandry will continue and release a few million more acres by 1940. On the other hand, partly as a result of governmental effort, there is now a notable shift from the more productive crops toward the less productive crops or to pasture, and in view of the prospect for milk consumption and the upward trend of the beef consumption cycle a retreat toward the less efficient farm animals in the transformation of feed into human food appears probable. On the whole, perhaps the best guess at present is that these four factors, all of which operated to increase production for a decade or more after the world war, will counter-balance each other during the next few years. It seems likely that the major changes in production which may occur will be accomplished mostly by means of the old factors that were so effective prior to the world war, namely, acreage in crops and yield per acre.

The prospect for Crop Yields per Acre - The acre-yield of the crops, taken as a whole, after remaining almost stationary for a decade prior to the close of the world war, decreased slightly during the decade following the war. (Figure 16). In this past season, 1933, the acre-yields of wheat were lower than in any other year since 1893, of corn than in any year since 1901, except 1913 and 1930, and of oats the acre-yield was the lowest on record. This was owing primarily to drought of extraordinary extent and severity, but weather conditions appear scarcely adequate to explain the downward trend in acre-yields, principally of corn, oats, rye and the grain sorghums, during the past decade or longer. Apparently, the depletion of soil fertility by erosion and crop removal, accompanied by a decline in the organic content of the soil in many parts of the United States, has proven as potent in affecting the average crop yield for the country as a whole as all the improvements in agricultural technique, including the use of artificial fertilizers. However, the use of fertilizer has declined during the depression. The forces of the research and extension services, plus the powerful aid of the agricultural press, have only counterbalanced the forces tending toward depletion of soil fertility during the past quarter century.

Looking to the future, it is not certain that the farmers, with the aid of the various agencies, will be even as successful as in the past in counter-acting the effects of soil depletion upon acre-yields of the crops, considering the national as a whole, unless higher prices of farm products permit extensive use of fertilizer on the less erosive lands, for the depletion of soil fertility by erosion is advancing at an accelerating rate. The Secretary of Agriculture in his recent annual report makes the following statement:

"Unrestrained soil erosion is rapidly building a wilderness of worn-out land in the United States. The wastage speeds up with the removal of the absorptive top soil down to the less absorptive, more erosive subsoil. Approximately 35,000,000 acres of formerly cultivated land have been essentially destroyed for crop production; 100,000,000 acres of land now in crops have lost

6/ It is interesting to observe that the acre-yields of wheat and cotton, the two crops which have expanded notably into the drier portions of the Great Plains, show no decline in national acre-yield, but, rather, a slight upward trend prior to 1932. Apparently, the more fertile soil in the case of wheat, and both better soil and greater freedom from injury by the boll-weevil in the case of cotton, have fully counterbalanced the frequently deficient moisture in the Great Plains region.

all or most of the topsoil; 125,000,000 acres of land now in crops are rapidly losing topsoil; and an additional area is suffering from erosion in some degree."

These figures indicate that an area equal to nearly one-tenth the present crop area of the United States has been destroyed by erosion, about one-quarter of the present crop land has lost all or most of the top soil, while a third is rapidly losing its topsoil. Erosion has been most severe in the South, owing in part to the fact that the two dominant crops, cotton and corn, are intertilled, which results not only in exposure of the soil to the rain and wind during most of the season, but also in lowering the organic matter in the soil, and organic matter is very important in retarding erosion. (Figure 17) In Addition, the rainfall is heavier in the south than in the north, and as the soil is not frozen, nor covered with snow during most of the winter, erosion can occur throughout the year.

In Oklahoma a recent survey revealed that of the 16,000,000 acres of crop land (including land which was formerly in crops) nearly 6,000,000 acres had reached the stage of gullying, and that about 1,400,000 acres had been abandoned largely because of erosion. ^{7/} There was a decrease of over 10,000 farms in south central and southeastern Oklahoma between 1920 and 1930, and of almost as many more in north central and northeastern Texas, where erosion is also becoming severe. It is the opinion of the Experiment Station workers in Oklahoma that fully two-thirds of the erosion losses in this State have occurred during the last ten years. In the Piedmont of Georgia and the Carolinas erosion has been in progress for a much longer period. Dr. Bennett, of the Bureau of Chemistry and Soils, states that "probably not less than 60 percent of the upland . . . has lost from 4 to 18 inches of its soil and subsoil . . . (and) many of the gullies have cut down to bed rock. ^{8/} In the Georgia and South Carolina portions of the Piedmont area depletion of soil fertility, in association with the advance of the boll-weevil and other factors, has exerted a devastating effect. The number of farms in the area decreased 50,000 between 1920 and 1930. In some counties nearly half the farm population migrated to the cities or other parts of the nation. Undoubtedly erosion was a factor also in inducing migration in much of North Carolina and Virginia, in Kentucky, Tennessee, and Arkansas, and even in parts of Missouri, southern Iowa and Illinois. In Illinois there are at least 9,000,000 acres of low value land subject to serious erosion, more than one-half of which is hardly suitable for cultivated crops, and there are more than 14,000,000 acres of high value land in which erosion is gradually approaching a stage where gullies are being formed ^{9/}

At the Missouri Agricultural Experiment Station measurements on a gently sloping field, typical of the soil and slope of much of the northern portion of the state, show a loss of over 245 tons of soil per acre continuously in corn during the 12 years the experiment has been in progress, 111 tons from land continuously in wheat, but of only 35 tons from land in a rotation of corn, wheat and clover, indicating that the surface soil, averaging seven inches deep, will last for 50 to 350 years, depending upon the cropping

^{7/} Soil Erosion Survey of Oklahoma, Extension Service, Agricultural and Mechanical Arts College, Stillwater, 1929, p. 2. The survey was made by the Experiment Station.

^{8/} Bennett, H. E., in "Documentary Material for the Inter-American Conference in Agriculture, Forestry and Animal Husbandry, "Oct. 1930, p.31.

^{9/} Mumford, H. W., Director of Illinois Agricultural Experiment Station, in a letter to the Secretary of Agriculture.

system. If put into blue-grass pasture it would require 2,300 years to remove the top seven inches of soil, which may be no more rapid than the process of soil development. It is estimated that "about one-fourth of the surface area of Missouri is subject to severe erosion, that one-fourth is subject to moderate erosion, and about one-half to light or negligible erosion." 10/

In the northeastern states, crop removal and leaching have reduced the fertility of millions of acres, particularly of land that has produced timothy hay for shipment to city markets. Reduction in soil fertility doubtless has been a factor in promoting migration from farms in these states. On the other hand, the development of dairying and egg production, and the importation of large quantities of mill feed, grain, and hay from the West for the cows and chickens, has doubtless resulted in improving the soil on many dairy and poultry farms. A vast transfer of the elements of soil fertility from the wheat regions and the corn belt to the dairy farms of the northeastern states is in progress. However, in the humid northern states, considered as a whole, the losses from the surface soil since settlement average possibly a third of the original sulphur, a fourth of the nitrogen, a fifth of the phosphorous and a tenth of the potassium. 11/ Calcium and magnesium losses have been notable in many soils. The losses by crop removal and leaching can be restored and maintained almost indefinitely, however, if it is found profitable to do so, for the known deposits of minerals containing these elements seem sufficient for centuries to come. But during the next decade, owing to erosion losses and to the probability that the extensive use of fertilizer will come slowly, it seems likely that acre-yields of the crops, taken as a whole, will continue to decline slowly.

Declining Agricultural Production - In this connection, it is worth noting that since 1926 the trend of agricultural production also has been downward. The year 1927 was rather wet, 1928 was a good year, almost as good as 1926 but the season of 1929 was very dry in much of the nation. In 1930 agricultural production remained low, but a notable recovery occurred in 1931. In 1932, however, production fell much lower than in 1927 or 1930; and during this past season, 1933, the production of wheat, also of oats, has been lower than in any year since 1896, when the population of the nation was only 57 percent that at present; the production of corn has been lower than in any year since 1901, with the exception of 1930, and the production of hay has been less than in any year since 1913, except 1930. This very low production of these major crops is owing primarily to weather conditions; but it seems probable that the depletion of soil fertility by erosion; by reduction of the humus content of the soil, and by the removal of a considerable proportion of the elements of fertility in the soil, particularly phosphorus, in the crops, the milk and the livestock sold, is slowly but surely affecting the agricultural production of the nation. Another factor may be the depletion of the farmers' capital, particularly the poor condition of the machinery and the decrease in use of commercial fertilizers.

10/ Miller, W. F., Professor of Soils, in a letter to the writer. See also Missouri Agricultural Experiment Station, Research Bulletin No. 63, p. 31, and Progress Reports of "Soil Erosion and Run Off Experiments in Piedmont, North Carolina," by F. O. Bartel, Mimeographed by U. S. Bureau of Agricultural Engineering.

11/ This is an audacious generalization. It is based, for sulphur, in part on a paper entitled "Agricultural Aspects of Sulphur and Sulphur Compounds," by J. G. Lipman and H. G. McLean, Chemical and Metallurgical Engineering, vol. 38, no. 7, July, 1931; for nitrogen, phosphorous and potassium on analyses of cropped and adjacent virgin soils of the same type, supplemented by data in a paper by Dr. Lipman entitled "The Nitrogen Outlook," Journal of the American Society of Agronomy, vol. 24, no. 3, pp. 227-237, 1932; and for potassium by lysimeter (leaching) measurements at Cornell University.

The Future Need for Farm Land

Of all the factors that influence the future need for farm land only one can be forecast with any precision, namely, the population of the Nation. It is practically certain that between now (February 1934) and January 1, 1940, the increase of population will be 3,000,000 to 5,000,000 and between 1940 and 1950 it may increase by as much more. At 3 acres of crops harvested per person this means that 9,000,000 to 15,000,000 more acres of crops will be needed by 1940 and 18,000,000 to 30,000,000 acres by 1950, other factors remaining equal. If the diet should shift from animal products toward more cereals or sugar, or if the exports of farm products should decline further, less land would be needed. However, per capita consumption of farm products, considered as a whole has changed very little during a third of a century, and it appears that a new level in exports of farm products has almost been reached. Considering changes in technique of production, it seems very probable that the number of horses and mules will decline for at least several years to come, but the land thus released may be counterbalanced by shifts from the more productive toward the less productive crops per acre, under the surplus control program, and the reversion of some crop land to pasture. It is certain that the soil resources of the Nation are being depleted rapidly, particularly by erosion, but this may be partially counterbalanced by the use of fertilizers.

On the whole, it appears probable that by 1940 several million more acres of crop land would be needed to supply the American people with their present per capita consumption of farm products and maintain the present exports of cotton. But the present per capita consumption may not be maintained and a shift back may occur toward the more productive crops per acre, or the more productive livestock per unit of feed consumed, though this is less likely. Moreover, this estimate is a net figure for the nation as a whole. Many millions of acres of land doubtless will go out of use for crops in certain regions, and many millions of acres come into use for crops in other regions. Between 1920 and 1930 the decrease in area of harvested crops exceeded 32,000,000 acres in 1,940 counties reporting a decrease, located mostly in the originally forested eastern and southern portion of the United States. The outstanding decrease was in the Piedmont of Georgia and South Carolina and in a belt extending from southern New England across New York, southern Michigan, Ohio, southern Indiana and Illinois and most of Kentucky and Missouri, to eastern Oklahoma and central Texas. (Figure 18) Part of this land is used for pasture, part lies idle, and part is growing up to brush. The soils in these areas, are, in general, poor or fair, but some are good. Much of the land is hilly or steeply rolling, and erosion has taken a heavy toll. These conditions, as well as the fact that many of the farms are small, has resulted in systems of farming poorly adapted to large scale machinery. And, where agriculture is dependent on hand labor, there is generally small production per worker.

During the same decade an increase of crop land exceeding 33,000,000 acres occurred in 1,130 counties reporting an increase, located mostly in the Great Plains region. (Figure 19). Despite the frequency of severe drought, the suitability of the land, of the crops grown, and of the large-sized farms in the Great Plains to the use of power machinery made agriculture profitable. But the very low prices for grain in recent years have brought acute distress to this region also.

The "Submarginal" Land Program

The proposal to purchase 40,000,000 acres of poor land, sometimes called submarginal land, is, therefore, in accord with the trend during the decade 1920 - 1930. I believe in the poor or submarginal land program for three reasons:

First, because there are millions of farm people who have not enough to eat. They live, but at a low level of health and efficiency. They have not enough because the land will not produce it. Since there is so much land in the nation of better quality, I believe in providing those people who give promise of being successful on better land an opportunity of relocating on such land, even if it should mean an increase in agricultural production, and even if it should mean a decrease in agricultural efficiency, when the people on the good land alone are considered. In case of conflict, social necessity must take precedence over economic efficiency. (Figure 20)

However, the movement of farmers from poor land to better land may not always involve an increase in commercial production of farm products. In central Georgia, for example, where one of the first projects of this character is being developed, the plan provides for giving farmers now producing cotton on small patches of sandy soils an opportunity of moving onto heavier soils in the same county. These heavier soils prior to the coming of the boll weevil were considered the best in the county, but as cotton matured very late on these soils they were abandoned because of the repeated destruction of the crop by the weevil. These heavier soils are better suited to general farming than the lighter soils, and the plan is to encourage cotton farmers to become general farmers, who will grow much of the food they need. It is probable that the only way many of the farmers of the South will have the milk, the eggs and the fresh vegetables which they and their families so urgently need, is by producing these foods on their farms. This Georgia project is a good example of the possibilities, which, no doubt, exist in many other places, of raising the standard of living of farmers without increasing the commercial production of farm products. It is probable that the sub-division of large commercial farms on good land and the location on these smaller farms of a number of partially self-sufficing farmers from poor land would, in some cases, have similar effects.

Although it is possible in some cases to move farmers from poor land onto good land, where large farms have been subdivided, without increasing commercial production, a study of the census data on type of farms and value of products indicates that, in general, commercial production would be increased. (Figure 21). This conclusion is confirmed by experience in eastern Germany, where the sub-division of large estates into peasant farms has almost doubled production per acre, the peasants commonly superposing live stock enterprises on the already existing grain growing system of farming. But such an increase of production in the United States is unlikely, except in those cases where cash grain farms may be transformed into dairy or other intensive types of agriculture.

The basic issue, however, in my opinion, relates to population rather than surplus production. There are nine percent fewer children under 5 years of age in the United States now than when the census was taken four years ago. Such a decline cannot continue long without awakening the people of the United States to a realization that the nation must conserve its human resources, particularly the people on the land. Moreover, since the birthrate is about twice as high among the farm population as it is among the dwellers in large cities, and since, in general, like produces like, a major objective of national policy should be, in my opinion, to preserve not only the quantity, but also the quality, that is, the inherent intelligence and ability, of the farm population.

The future belongs to the children on the farms. The children of the city-born are less numerous than their parents, whereas the children in the farm population are more numerous than their parents. If the existing ratio or urban to rural reproduction remains, and even if it be considerably altered, it is clear that within a few generations the present urban population will be represented by only a remnant, and provided immigration does not become heavy, the population of the nation will consist largely of the descendants of the farmers and farm women of today.

The sub-marginal land program deserves support, secondly, because it will conserve natural as well as human resources. There are millions of acres of farm land eroding away, and the plight of the people on these lands is likely to go from bad to worse. These lands are now producing misery for many people. They can be made to produce happiness for fewer people by converting them into forests or pastures. And whereas the present crop production is transitory, the future forest and pasture production can be permanent. The individual may consider only the present, but the nation must consider the future. The individual may consider only his farm, but the nation or the state must consider the land farther down stream that may be covered by the wash from the eroding fields, also the rivers that may silt up and impede navigation, and the levees that may need to be built to prevent damage by the flood waters from eroded lands.

I hope that the poor land program may be concentrated at first largely on areas where soil erosion is severe, for in such areas a double objective could be attained, - the salvation of the people and the conservation of the land.

Thirdly, the poor land program will in many places help to reduce taxation. In the northern portions of the Lake States particularly, settlers have been located on the cut-over and sandy lands many miles from the nearest school. Sometimes a road and a school have to be maintained for a single family at a cost many times greater than the taxes they pay. This is an abuse of a well-intentioned and wise State provision for the education of every citizen. Such people in Wisconsin are being given the opportunity of moving onto better land near established villages or settlements with the aid of an allotment from the Subsistence Homesteads Division.

The Subsistence Homesteads Program

The Subsistence Homesteads policy also deserves support because it will benefit, in my opinion, both city people and farmers, but farmers more than city people. There are nearly three million young people held back on farms, who would under predepression conditions have gone to the cities. Some will go to the cities, undoubtedly, as prosperity returns; but prosperity, in my opinion, will not create jobs as rapidly in the future as in the past. It seems probable to me that, if the subsistence homesteads movement continues, the homesteads will be eventually occupied largely by young people from the farms. Owing to progress in technique, the number of persons engaged in manufacturing and mechanical pursuits was decreasing for nearly a decade prior to the depression, as noted this morning, and this decrease is likely to continue. More and more city people have had to resort to selling something. The proportion of the population engaged in trade and commerce doubled in the 20 years between 1910 and 1930, and it is very doubtful if the per capita consumption of goods increased nearly as much. But the cost of distribution, apparently, is becoming greater for many commodities than the traffic will bear. For example, a friend in the Department of Agriculture who owns a farm some distance out of Washington takes enough of his wheat for his own use to a local mill near the

farm and has it ground into flour. For 5 bushels of wheat he gets a barrel of flour, whereas if he sold the wheat at the elevator it would require 10 bushels of wheat to buy a barrel of flour at the retail store.

The subsistence homesteads, if they continue to be developed on a considerable scale, are likely in time to provide more homes for farmers sons than they are for migrants from the large cities, secondly, because industries that relocate in villages or small towns probably will employ mostly local labor. Such labor will work for a lower wage than city labor. Moreover, many of the employees who may move with the factory from the city will not want to farm. They will be accustomed to city ways and, in general, will be disinclined to get up early in the morning to milk the cow, or work late at night weeding the garden. Judging from the record of part-time farming in Los Angeles County, Cal., the white collar workers will be more attracted to such village or suburban life than will the unskilled or semi-skilled laborers of the cities. And of these white collar workers the most successful in part-time farming are, in general, those who were brought up on farms.

Moreover, the great surplus of old people is in the cities, and the great surplus of young people is on the farms. It is young people mostly who migrate, not old people. These young people on the farms can migrate only in three directions - to the cities, to the villages with or without part-time farms, and to full-time farms. Migration to the city has been retarded by the depression, and probably will continue to be retarded, though not to the same degree. Moreover, if the farmer's children go to the city, the probability is that the family, if not the race, will slowly die out; and, as previously noted, migration from the farms to the cities will certainly hasten the decline in the nation's population and thereby tend to reduce the future market for farm products.

Migration to the village or to so-called subsistence farms will tend to increase agricultural production more than if these young people moved to the cities, but less than if they remained on the farms. Migration to the villages is the only alternative, apparently, to an eventual decline in the national population on the one hand, or an immediate increase in number of full-time farmers, on the other hand. These three millions of young people held back on farms by the depression will soon want to establish homes of their own. If there is no net migration from farms between 1930 and 1940, that is, if net migration from farms during the next six years balances the net migration to farms during the past four years, there will be about 2,250,000 more males on farms in 1940 than there were in 1930; and if the same proportion of these males are operating farms in 1940 as in 1930, there will be over a million more farms in the nation in 1940 than there were in 1930.

Those who fear that the subsistence homestead program will increase agricultural production should contemplate the alternatives, which are, in my opinion, increased urbanization and national depopulation, or greatly increased number of farmers and decline in the rural standard of living. A million more farmers in the United States would mean not only the subdivision of many large farms, but also of many small farms, and the reoccupation of many abandoned farms, especially in regions of poor soils where the birthrate usually is highest and the number of young people is most numerous. Unless we are willing to contemplate with approval a rapidly declining national population, the alternatives to be considered are, apparently, not whether we shall have more or less farmers, but whether we shall have more full-time or more part-time farmers.

My hope is that neither the congestion of a peasant-like population on the land, nor migration of young people to the cities, will develop extensively, but that, instead, decentralization of industry, and of commerce also to some extent, associated with much part-time farming, may increase rapidly. The villages, the suburbs and the small cities, with their more uniform distribution of wealth, more general accumulation of property, and their greater economic security for the majority of the people, also their more normal manner of family life, than in the large cities, constitute, I believe, the hope of the future. Whether this hope is realized, that the migration from the farms may be mostly to the smaller places, will depend largely on where the young people now on farms really prefer to live.

The Preservation of the Family

And where the young people prefer to live will determine, in my opinion, the destiny of the Nation. For it is becoming clear that city life, under the conditions of the modern economic system, is inducing a decline in both the quantity and quality of the population. The smallest number of children to the cities is found among the presumably more intelligent and certainly more ambitious classes - the professional men, business men, and those in clerical occupations. It is to these who are trying hardest to climb the ladder of professional, economic, or social success, that children seem to be too heavy a load to carry. To the farmer a wife is definitely a partner in the business enterprise, indeed, almost a necessity, while children can help with the farm work from, perhaps, 10 years of age onward, and with the housework at an earlier age; but in the urban occupations a wife is less closely identified with the business operations, unless she also works outside the home, while children are often an economic liability. Moreover, as the family is weakened, so also is the spirit of altruism and sense of moral responsibility. Back of the declining birthrate lies, I believe, a decline in ethical ideals as well as religious principles. Back of the economic crisis lies a social crisis, and back of the social crisis lies a moral crisis. The fundamental crisis today is the crisis in character.

The restoration of the family as the fundamental institution of society, the development of an economic system which does not penalize parenthood, the establishment of a social code which approves the self-sacrifice of parents for the sake of children, and the revival of emphasis on the duty of the individual to promote the welfare of the nation and the race, are, in my opinion, essential to the preservation of our civilization. If the American people continue in the way they are going, there will be much less farm land needed a century hence than is in use today.

In this connection may I read an excerpt from a remarkable book, entitled, "The Dawn of Conscience" by Professor Breasted, of the University of Chicago, the great authority on the archeology and early history of Egypt. He writes:

"The surviving documents demonstrate historically that the thing which was long called 'the moral consciousness of mankind' has grown up with each generation out of the discipline and the emotions of family life, supplemented by reflection and the teaching of experienced elders. The supreme values which lie within the human soul have therefore, as a matter of historical fact, entered the world for the first time through the operation of those gentle and ennobling influences which touch us continually in our family life. Whether in the beginning they were anywhere else out yonder in this vast universe, we shall never know; but they were not anywhere here upon our globe until the life of father, mother, and children created them. It was the sunshine and the

atmosphere of the earliest human homes that created ideals of conduct and revealed the beauty of self-forgetfulness.

"Bertrand Russell, in his latest book (Education and Social Order) espousing the cause of communism, tells us that the most important change which communism would introduce is the abolition of the family, and, throwing human experience entirely overboard, he advocates this change. Notwithstanding the revolt of the new generation, human experience cannot be annihilated, nor can the traits it has produced in us be obliterated or ignored. The young people of today have indeed revolted against authority, whether it be that of the church or the mandate of Scripture. To invoke authority is always to invite opposition, especially in the minds of youth. But the human past shines upon us like a great light, and there is no need to invoke authority. If any young readers take up this book, I beg them merely to contemplate the facts of human experience now revealed to us in fuller measure than ever before. There are other sources of reverence, besides the declarations of Scripture of the pronouncements of the Church. Men like William Morris and Walt Whitman have loved and revered the life of man on earth, and have found inspiration and guidance in the contemplation of its relationships. There is one supreme human relationship, that which has created the home and made the family fireside the source out of which man's highest qualities have grown up to transform the world. As historical fact, it is to family life that we owe the greatest debt which the mind of man can conceive. The echoes of our own past from immemorial ages bid us unmistakably to venerate, to cherish, and to preserve a relationship to which the life of man owes this supreme debt." 12/

In Conclusion

Now, a word in conclusion. Science and invention have transformed the world. Consider the changes in agriculture, in industry, in transportation which have occurred during the past century. These changes have been greater than those in all the thousands of years that preceded. But another change more basic in character has developed almost unnoticed. Probably as profound and far reaching in its effects as the control over the physical forces of nature will be the control which man is now acquiring over the reproduction of the race.

Let us take ten people in our large cities, where there is now a deficit of about 30 percent in number of children necessary to maintain a stationary population; and let us assume further that this deficit will not change though during the past decade it increased rapidly. These 10 people have 7 children, these 7 will have less than 5, these 5 will have a little over 3. Three generations, or a century, and such a population, if this trend continues, will have fallen to one-third the former level.

Let us take 10 people in our rural regions, where there is now about 30 percent surplus in children above the number necessary to maintain population stationary. They now have 13 children. If this ratio can be retained these children, after they grow up, will have 17 children, and these in turn will have about 22 children. A century hence such population will have doubled.

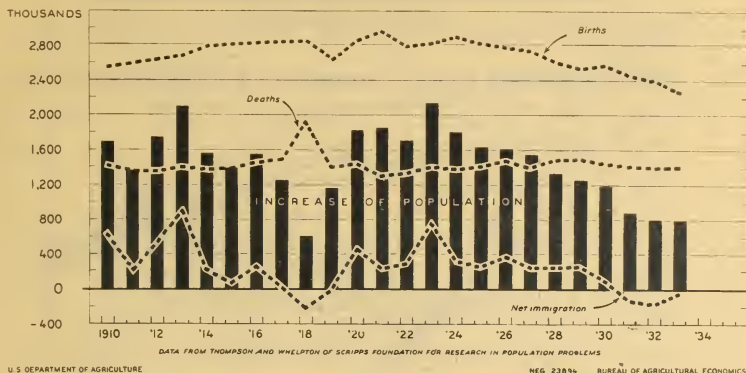
But the rural population is now less than half the total population, and from the economic standpoint fewer rather than more people are needed in agriculture. Half the farmers produced about 88 percent of the commercial production of farm products in 1929, and could readily produce the remainder.

The great problem, the solution of which appears essential to the further progress, perhaps even to the preservation of modern Occidental civilization, is how to alter the non-agricultural portion of the economic system so that it will not penalize parenthood. If nothing is done, we must contemplate the probability, amounting almost to certainty, of a declining national population. A stationary population probably is desirable, but a declining population will have serious economic and social consequences, particularly if the decline be rapid. If the decrease a half century hence be as rapid as that in births during the past decade - over 20 percent - the decline will become a debacle. Not only will the demand for farm products decline, but also the demand for many manufactured commodities. Vacant houses, vacant store rooms, idle factories, abandoned farms will tend to lower rents and interest returns and thereby temporarily lower the cost of living, but the lessened return to capital is likely to depress gradually the spirit of enterprise, and may well lead to increasing dependence upon government. The decreasing number of children will probably diminish the incentive for saving. It is possible that progress in technique may counter-balance for awhile the trend toward consumption of capital, but this is by no means assured. Vacant buildings and abandoned lands are likely also to exert a depressing psychological influence. The greatly increased proportion of old people will have, likewise, a depressing effect.

The future need for farm land depends largely upon the extent to which the rural people adopt the urban philosophy of life, and upon the extent of the migration which may set in from the farms to the cities. These are the great uncertainties. But, in my opinion, this is certain - that if the downward trend in the birthrate persists and the predepression migration to the cities is resumed, while immigration from abroad is excluded, there will develop after a decade or two of time a decline in crop acreage which will be persistent, progressive, and ultimately precipitous.

On the other hand, if the rural people retain their ideals of family life, and the young men and women grow on farms, but not needed in agriculture, migrate to the villages and small towns, where they find work in industry and commerce, supplemented by much part-time farming, there may develop a period in which the fruits of science and invention will be more widely distributed among the people than in the past, in which the fear of unemployment and poverty may largely disappear, in which the philosophy of life that encouraged sacrifice for the sake of children may return, in which mutual confidence may displace distrust in the business world, new hope inspire the people to greater effort and renewed faith in God help to give meaning to life.

THE ANNUAL INCREASE OF POPULATION OF THE UNITED STATES, BIRTHS, DEATHS, AND IMMIGRATION OR EMIGRATION, 1910 TO DATE



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FIGURE 1 - TEN YEARS AGO THE POPULATION OF THE UNITED STATES WAS INCREASING ABOUT 1,800,000 A YEAR. NOW THE INCREASE IS ONLY 800,000. A STATIONARY POPULATION IS APPROACHING RAPIDLY, BUT IT APPEARS TO BE 10 TO 20 YEARS OFF OR LONGER. THE NUMBER OF BIRTHS HAS BEEN TRENDING DOWNWARD SINCE 1921. THERE ARE NOW FULLY 10 PERCENT FEWER CHILDREN UNDER 5 YEARS OF AGE THAN WHEN THE CENSUS WAS TAKEN NEARLY FIVE YEARS AGO AND 8 PERCENT FEWER 5 TO 10 YEARS OF AGE. THE NUMBER OF DEATHS REMAINS ALMOST STATIONARY, BUT MUST INCREASE SOON, BECAUSE OF THE RAPID INCREASE OF OLD PEOPLE. THERE WERE 34 PERCENT MORE PEOPLE OVER 65 YEARS OF AGE IN THE NATION IN 1930 THAN IN 1920, AND ANOTHER INCREASE OF ONE-THIRD IS INEVITABLE BETWEEN 1930 AND 1940.

NUMBER OF CHILDREN UNDER 5 YEARS OF AGE PER 1,000 WOMEN 16 TO 44 YEARS OF AGE (INCLUSIVE) UNITED STATES, 1800-1930 AND ESTIMATE FOR 1934



*ESTIMATES OF PROF. WALTER WILLCOX PRIOR TO 1880. SEE PUBLICATION AMERICAN STATISTICAL ASSOCIATION VOLUME XII PAGE 495. BOSTON 1912
CHILDREN-RATIO OF BIRTHS 1825-1829 TO CENSUS 1830, APPLIED TO BIRTHS 1825-1933

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FIGURE 2 - THE BIRTHRATE, AS MEASURED BY THE RATIO OF CHILDREN UNDER 5 TO WOMEN OF CHILDBEARING AGE, HAS BEEN DECREASING IN THE UNITED STATES FOR MORE THAN A CENTURY. FROM 1920 TO 1930 THE DECLINE WAS OVER TWICE AS RAPID AS IN PREVIOUS DECADES, EXCEPT THOSE ENDING IN 1850, 1870, AND 1890, WHEN IT IS EVIDENT THERE WAS AN ABNORMAL UNDER-ENUMERATION OF YOUNG CHILDREN. FROM 1930 TO 1934 THE DECLINE WAS ALMOST AS GREAT AS IN ANY PREVIOUS DECADE. THE SIGNIFICANT FACT SHOWN BY THE GRAPH IS THAT THE DECLINING BIRTHRATE IS A LONG-TIME TREND, AND THAT THE RATE OF DECLINE HAS BECOME MORE RAPID IN RECENT YEARS.

BIRTH RATES: FIVE COUNTRIES OF NORTHWESTERN EUROPE, 1870-1933

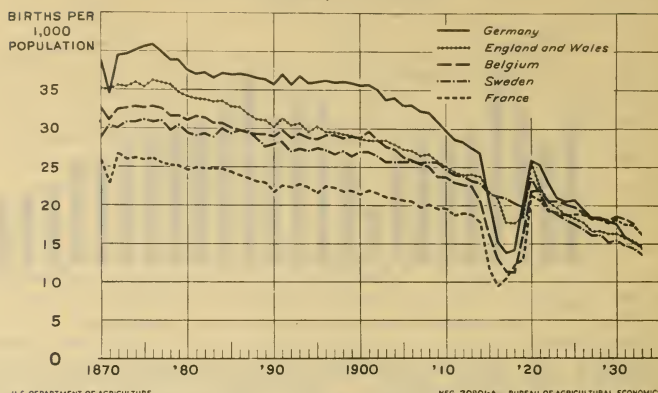
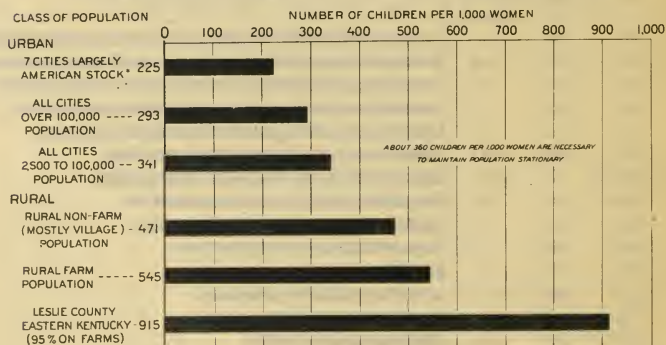


FIGURE 3 - BIRTH RATES ARE DECLINING IN NORTHWESTERN EUROPE, WHICH HAS HITHERTO PROVIDED THE PRINCIPAL EXPORT MARKET FOR AMERICAN FARM PRODUCTS. THE MARKED DECREASE IN THESE COUNTRIES IN THE YEARS OF THE WORLD WAR WAS MERELY A DISLOCATION IN AN OTHERWISE STEADILY DECLINING TREND. THIS TENDENCY IS OCCURRING WHEREVER INDUSTRIALISM AND URBANIZATION ARE IMPORTANT. IN GREAT BRITAIN THE POPULATION WILL REACH A MAXIMUM ABOUT 1936, AND SOON AFTER WILL BEGIN TO DECLINE. IN GERMANY THE MAXIMUM PROBABLY WILL BE REACHED A FEW YEARS LATER, AND, UNLESS THE BIRTH RATE RISES, THE DECLINE LATER WILL BE RAPID, SINCE 10 ADULTS ARE HAVING ONLY 7 CHILDREN. AT THIS RATE GERMANY IN A CENTURY WILL HAVE ABOUT ONE-THIRD THE PRESENT POPULATION UNLESS THERE IS IMMIGRATION FROM ABROAD. HOWEVER, RECENT DEVELOPMENTS IN GERMANY SUGGEST THAT A RISING BIRTH RATE MAY BE IN PROSPECT.

NUMBER OF CHILDREN UNDER 5 YEARS OF AGE PER 1,000 WOMEN 15 TO 44 YEARS OF AGE ON APRIL 1, 1930, URBAN COMPARED WITH RURAL POPULATION IN UNITED STATES



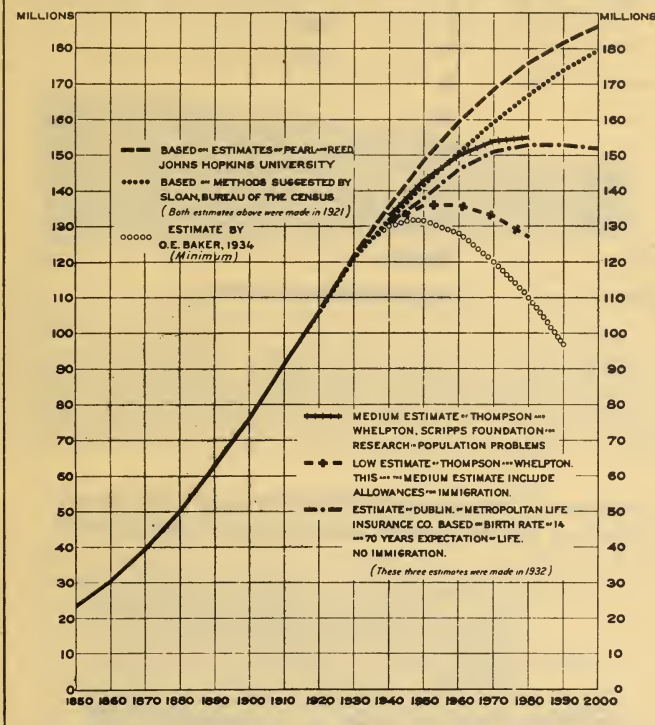
* PORTLAND (OREGON), SAN FRANCISCO, LOS ANGELES, KANSAS CITY, ST. LOUIS, NASHVILLE, AND ATLANTA

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FIGURE 4 - ABOUT 360 CHILDREN UNDER 5 YEARS OF AGE PER 1,000 WOMEN 15 TO 45 YEARS OF AGE (CHILD-BEARING AGE) ARE REQUIRED TO MAINTAIN POPULATION STATIONARY AT THE 1930 EXPECTATION OF LIFE IN THE UNITED STATES OF 62 YEARS. IN 1930 THE SEVEN CITIES LARGELY OF AMERICAN STOCK, REPRESENTED IN THE TOP BAR OF THE GRAPH, LACKED, THEREFORE, ABOUT 36 PERCENT OF HAVING ENOUGH CHILDREN TO MAINTAIN THEIR POPULATION PERMANENTLY WITHOUT ACCESSIONS FROM OUTSIDE, AND ALL CITIES OF OVER 100,000 POPULATION HAD A DEFICIT OF NEARLY 20 PERCENT, WHILE THE SMALLER CITIES HAD A DEFICIT OF ABOUT 6 PERCENT. ON THE OTHER HAND, THE RURAL NON-FARM (MOSTLY VILLAGE AND SUBURBAN) POPULATION HAD A SURPLUS OF 30 PERCENT, AND THE FARM POPULATION A SURPLUS OF 50 PERCENT. IN 1932 URBAN DEFICIT AND RURAL SURPLUS ABOUT BALANCED.

POPULATION OF THE UNITED STATES 1850-1920 AND ESTIMATES OF POPULATION 1930-2000 A.D.



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FIGURE 5 - IN 1921 PEARL AND REED, OF JOHNS HOPKINS UNIVERSITY, PROJECTING POPULATION TRENDS ON THE BASIS OF A LOGISTIC CURVE, ESTIMATED THAT THE POPULATION OF THE UNITED STATES WOULD BE ABOUT 190,000,000 BY THE YEAR 2,000, AND WOULD INCREASE FOR SEVERAL DECADES THEREAFTER. BUT BIRTHS STARTED TO DECLINE IN 1922 AND BY 1932 AN ESTIMATE MADE BY DUBLIN, ALSO THE "MEDIUM" ESTIMATE OF THOMPSON AND WHELPTON, INDICATED THAT THE POPULATION OF THE UNITED STATES PROBABLY WOULD NEVER EXCEED 156,000,000 AND THAT THE STATIONARY CONDITION WOULD BE REACHED ABOUT 1980. THE THOMPSON AND WHELPTON "MINIMUM" ESTIMATE INDICATED A MAXIMUM POPULATION OF 136,000,000 ABOUT 1956. THIS "MINIMUM" ESTIMATE APPEARS NOW THE SAFEST, ALTHOUGH THE FIGURE FOR JANUARY 1, 1934, EXCEEDS THE ACTUAL POPULATION BY ABOUT 300,000. SHOULD THE AVERAGE DECREASE OF 60,000 IN NUMBER OF BIRTHS EACH YEAR DURING THE PAST DECADE CONTINUE, AND SHOULD IMMIGRATION BE BALANCED BY EMIGRATION, THE POPULATION OF THE UNITED STATES WILL REACH A MAXIMUM ABOUT 1946, AND THEN BEGIN TO DECLINE. BUT THE DECLINE WILL BE SLOW FOR A DECADE OR MORE. THE PROSPECT IS THAT THE POPULATION OF THE NATION WILL NOT DIVERGE MORE THAN 10 OR 12 PERCENT FROM THE PRESENT NUMBER WITHIN THE NEXT 25, POSSIBLY 50, YEARS.

ACRES REQUIRED TO PRODUCE 1,400,000 CALORIES OF CERTAIN FOODS United States, 1922-1924

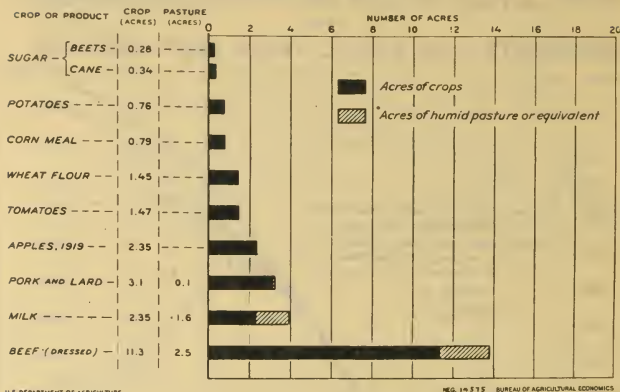


FIGURE 6 - ONE-THIRD OF AN ACRE IN SUGAR CROPS PRODUCES ABOUT AS MANY CALORIES OF FOOD AS THREE-FOURTHS ACRE OF POTATOES OR CORN, OR ONE AND A HALF ACRES OF WHEAT OR TOMATOES. BUT, LACKING PROTEIN AND FAT, A PERSON COULD NOT LIVE ON SUGAR ALONE. THE CEREAL DIET WOULD MAINTAIN HEALTH MUCH LONGER. TO MAINTAIN HEALTH PERMANENTLY MEAT, MILK, OR OTHER FOODS RICH IN PROTEIN, FAT, AND VITAMINS SHOULD BE ADDED. THESE REQUIRE THREE TO FOUR ACRES OF CROPS AND PASTURE TO YIELD THE SAME ENERGY VALUE IN PORK OR MILK, OR 12 TO 14 ACRES DEVOTED TO BEEF PRODUCTION. IN EXPLANATION OF THE TITLE, THE YEARLY PER CAPITA DISAPPEARANCE OF FOODSTUFFS IN THE UNITED STATES IS ABOUT 1,400,000 CALORIES. FIGURES USED IN PREPARING THE GRAPH ARE PRELIMINARY.

Changes in Consumption of Food Products Per Person Total and Six Principal Products, United States, 1909-1933

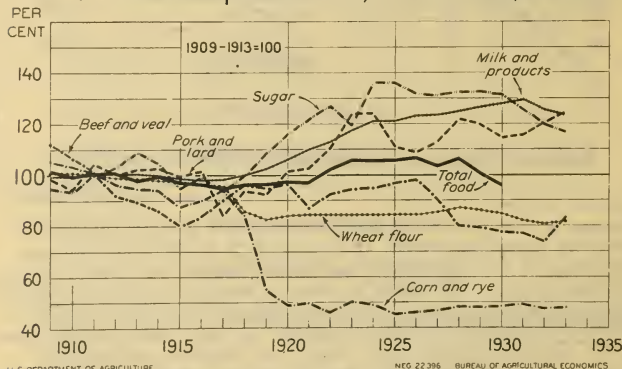
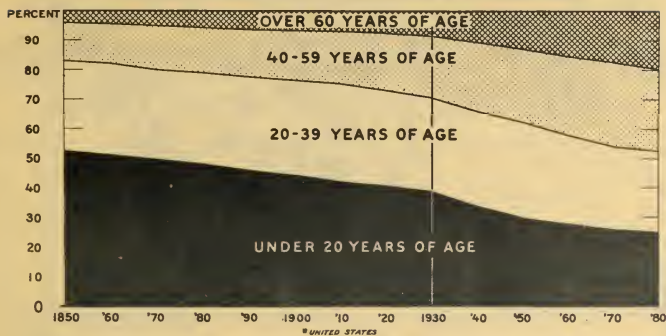


FIGURE 7 - THE WORLD WAR WORKED SIGNIFICANT CHANGES IN THE DIET OF THE AMERICAN PEOPLE. PERHAPS OF EQUAL IMPORTANCE WAS THE PROHIBITION AMENDMENT TO THE CONSTITUTION, THE PROSPERITY OF THE URBAN PEOPLE DURING AND AFTER THE WAR, AND THE FOOD EDUCATION ARTICLES AND ADVERTISEMENTS IN THE POPULAR MAGAZINES. THE RESULT PRIOR TO THE DEPRESSION WAS A DECLINE OF ABOUT 80 POUNDS PER PERSON SINCE THE PREWAR YEARS IN CONSUMPTION OF CEREAL FOODS, AND AN INCREASE OF ABOUT 25 POUNDS PER PERSON IN THE CONSUMPTION OF SUGAR; ALSO A NOTABLE INCREASE IN THE CONSUMPTION OF PORK, PROBABLY OF MILK ALSO, AND PERHAPS AN EQUAL INCREASE IN USE OF FRUITS AND OF VEGETABLES. DURING THE EARLY DEPRESSION YEARS, 1930 AND 1931, THE CONSUMPTION OF MILK CONTINUED TO INCREASE, BUT IN 1932 AND 1933 A DECREASE OCCURRED. THE USE OF SUGAR AND OF VEGETABLES HAS ALSO DECLINED, APPARENTLY, BUT OF PORK HAS BEEN WELL MAINTAINED. REVISED ESTIMATES OF MILK CONSUMPTION MADE SINCE THIS GRAPH WAS PREPARED INDICATE AN INCREASE OF ONLY ABOUT 10 PERCENT SINCE THE PREWAR YEARS, AND A DOWNWARD TREND IN TOTAL FOOD CONSUMPTION SINCE 1923.

PROPORTION OF THE POPULATION IN VARIOUS AGE GROUPS, 1850-1930,
AND THOMPSON'S AND WHELPTON'S "LOW" ESTIMATE, 1930-1980*



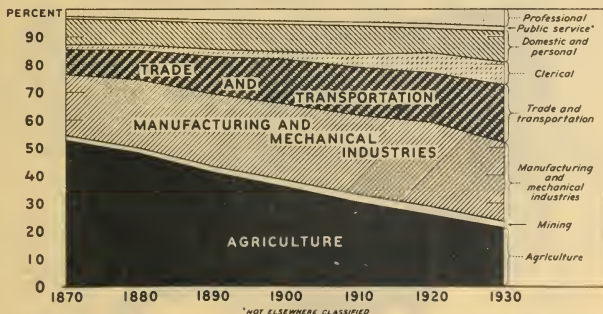
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FIGURE 8 - IN 1870 OVER HALF THE POPULATION WAS UNDER 20 YEARS OF AGE, BUT IN 1930 LESS THAN 40 PERCENT. BY 1950 THESE CHILDREN AND YOUNG PEOPLE PROBABLY WILL CONSTITUTE ONLY 30 PERCENT OF THE POPULATION AND BY 1980, OR BEFORE, ONLY 25 PERCENT. IN 1870 ABOUT 5 PERCENT OF THE POPULATION WAS OVER 60 YEARS OF AGE. BY 1930 THE PROPORTION HAD RISEN TO 8.6 PERCENT. BY 1950 THESE OLD PEOPLE WILL CONSTITUTE 13 PERCENT OF THE POPULATION, AND BY 1980 PROBABLY 20 PERCENT. IN 1870 ABOUT 45 PERCENT OF THE POPULATION WAS BETWEEN 20 AND 60 YEARS OF AGE, WHICH MAY BE CONSIDERED THE PRODUCTIVE YEARS OF LIFE, TAKING THE PEOPLE AS A WHOLE. BY 1930 PEOPLE IN THESE PRODUCTIVE AGES CONSTITUTED 52.6 PERCENT OF THE TOTAL POPULATION. BY 1950 THEY WILL CONSTITUTE ABOUT 57 PERCENT, AND BY 1980 PERHAPS 55 PERCENT. DURING THE NEXT FEW DECADES, WHEN POPULATION WILL BE ALMOST STATIONARY, A LARGER PROPORTION OF THE POPULATION WILL BE OF PRODUCTIVE AGE THAN IN THE PAST, OR, PROBABLY IN THE MORE DISTANT FUTURE.

Shifts in Occupations, 1870-1930

PERCENTAGE OF ALL PERSONS OVER 16 YEARS OF AGE
ENGAGED IN EACH MAJOR GROUP OF OCCUPATIONS



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FIGURE 9 - THE DECREASE IN THE PROPORTION OF THE POPULATION WHO WERE ENGAGED IN AGRICULTURE, MADE POSSIBLE BY THE ADVANCES IN TECHNIQUE, PARTICULARLY THE INCREASE IN POWER USED PER WORKER, RESULTED IN A GREAT CITYWARD MIGRATION OF YOUNG PEOPLE FROM THE FARMS, WHICH WAS NOTABLY HEAVY FROM 1870 UNTIL 1930. UNTIL ABOUT 1920 THESE RURAL YOUTH, AS WELL AS URBAN YOUTH, FOUND INCREASING EMPLOYMENT IN MANUFACTURING, MINING, TRADE AND TRANSPORTATION, CLERICAL WORK, AND THE VARIOUS PERSONAL AND PROFESSIONAL SERVICES. BUT SOON AFTER 1920 A DECLINE STARTED ALSO IN THE PROPORTION OF THE POPULATION ENGAGED IN MINING AND IN MANUFACTURING AND MECHANICAL PURSUITS. AS A CONSEQUENCE, TRADE AND CLERICAL WORK AND THE VARIOUS SERVICES ABSORBED MANY OF THE YOUNG PEOPLE NO LONGER NEEDED IN THE BASIS PRODUCTIVE INDUSTRIES. BETWEEN 1910 AND 1930 THE NUMBER OF PERSONS ENGAGED IN TRADE, AND CLERICAL SERVICES, CONSIDERED JOINTLY, ALMOST DOUBLED, WHILE THE POPULATION OF THE NATION INCREASED ONLY ONE-THIRD. ADOPTED FROM A DIAGRAM PREPARED BY RALPH S. HURLIN AND MEREDITH B. GIVENS "RECENT SOCIAL TRENDS IN THE UNITED STATES," A REPORT OF THE PRESIDENT'S RESEARCH COMMITTEE, NEW YORK, 1933.

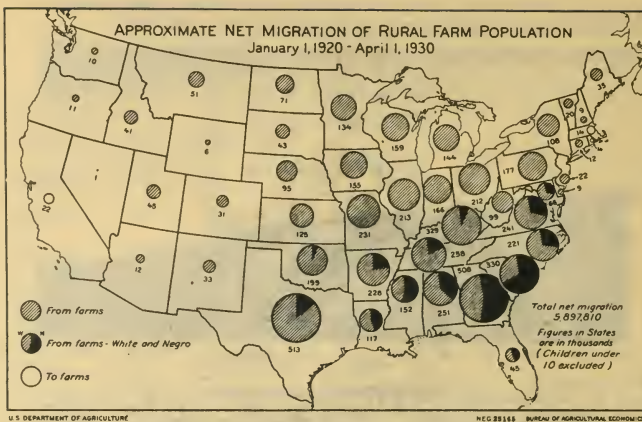


FIGURE 10 - ABOUT 60 PERCENT OF THE NET MIGRATION FROM THE FARMS DURING THE DECADE 1920-1930 WAS FROM THE SOUTH. NEGROES CONSTITUTED ONE-THIRD OF THIS MIGRATION FROM SOUTHERN FARMS. A MAJORITY OF THESE MIGRANTS WERE BETWEEN 15 AND 30 YEARS OF AGE. THE BIRTHRATE IS HIGH AMONG SOUTHERN RURAL PEOPLE, AND ECONOMIC OPPORTUNITY IS LESS THAN IN THE NORTH. IF IT COSTS ONLY \$2,000 TO REAR AND EDUCATE A CHILD TO THE AGE OF FIFTEEN (\$135 A YEAR AND NO ALLOWANCE FOR INTEREST), THESE 3,600,000 MIGRANTS FROM FARMS IN THE SOUTHERN STATES REPRESENT A CONTRIBUTION ROUGHLY OF \$7,000,000,000 MADE DURING THE DECADE BY THE FARM POPULATION OF THE SOUTH TO OTHER PARTS OF THE NATION, MOSTLY TO THE CITIES. MAP FROM "RECENT SOCIAL TRENDS," 1933, PUBLISHED BY MCGRAW-HILL BOOK COMPANY.

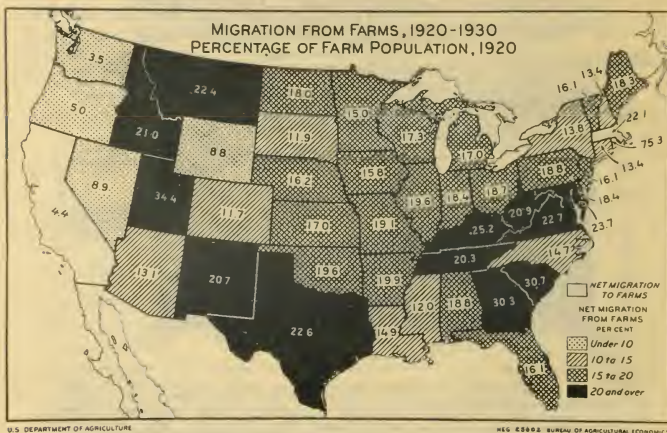
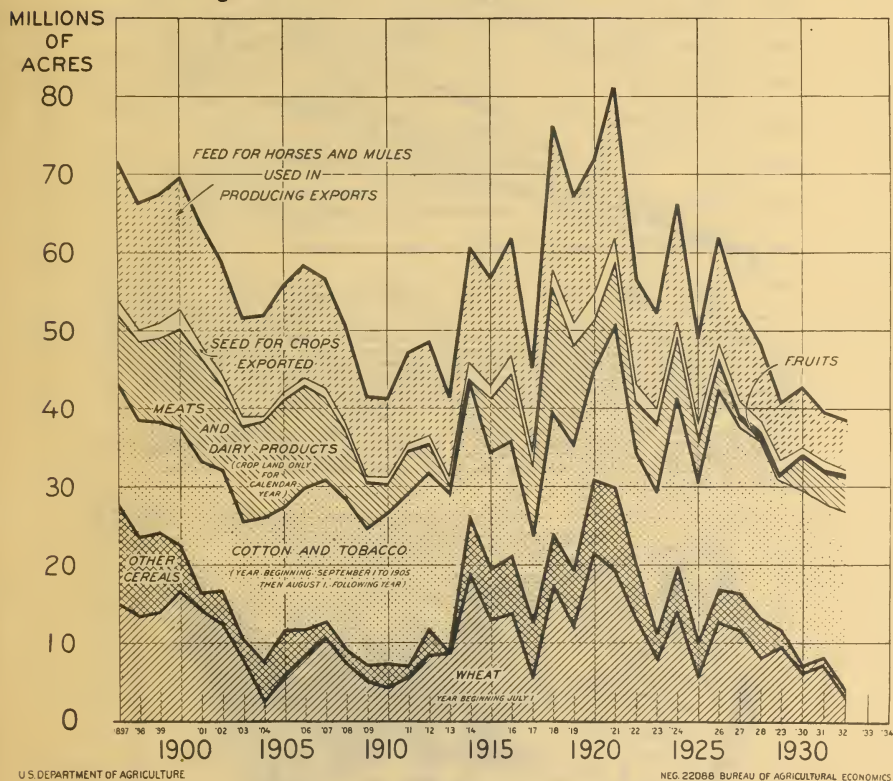


FIGURE 11 - RELATIVE TO THE FARM POPULATION IN 1920 MIGRATION FROM THE FARMS WAS, LIKEWISE, HEAVY IN MUCH OF THE SOUTH, RISING TO 30 PERCENT IN GEORGIA AND SOUTH CAROLINA. IT WAS EVEN HIGHER IN UTAH. IN THE BORDER STATES OF THE OLD SOUTH, IT VARIED FROM 20 TO 25 PERCENT, WHILE IN ARKANSAS AND OKLAHOMA IT WAS ALMOST 20 PERCENT. IN THE NORTH THE RANGE WAS FROM 12 PERCENT IN SOUTH DAKOTA TO NEARLY 20 PERCENT IN MISSOURI AND ILLINOIS, EXCEPT THAT IN MASSACHUSETTS AND RHODE ISLAND THERE WAS A NET MIGRATION TO FARMS. IN THE FAR WEST THE RATIO OF MIGRATION TO POPULATION VARIED PRIMARILY WITH THE RELIGIOUS INFLUENCE AND THE BIRTH RATE. IN OREGON AND WASHINGTON, WHERE THE BIRTH RATE IS VERY LOW, THE RATIO WAS ONLY 5 AND 3.5 PERCENT, RESPECTIVELY, AND IN CALIFORNIA, THERE WAS A NET MIGRATION TO FARMS.

Approximate Acreage Required to Produce Net Exports Major Farm Products, 1897-1932



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FIGURE 12 - THE ACREAGE REQUIRED TO PRODUCE THE AGRICULTURAL EXPORTS FROM THE UNITED STATES HAS BEEN LOWER DURING THE LAST THREE YEARS THAN IN ANY PREVIOUS YEAR SINCE THE BEGINNING OF THE CENTURY. THE CROP ACREAGE REQUIRED TO PRODUCE THE EXPORTS OF MEAT, MOSTLY PORK AND LARD, FOR SIX YEARS HAS BEEN ONLY A FEW MILLION ACRES. COTTON NOW CONSTITUTES THREE-FOURTHS OF THE EXPORTS OF FARM PRODUCTS, AND THE UNITED STATES IS NOW PROVIDING ABOUT AS LARGE A PROPORTION AS EVER OF THE WORLD'S CONSUMPTION OF THIS CROP. FIGURES USED IN PREPARING THE GRAPH ARE PRELIMINARY AND SUBJECT TO REVISION.

Agricultural Production, Crop Land Farm Labor and Population 1897-1934

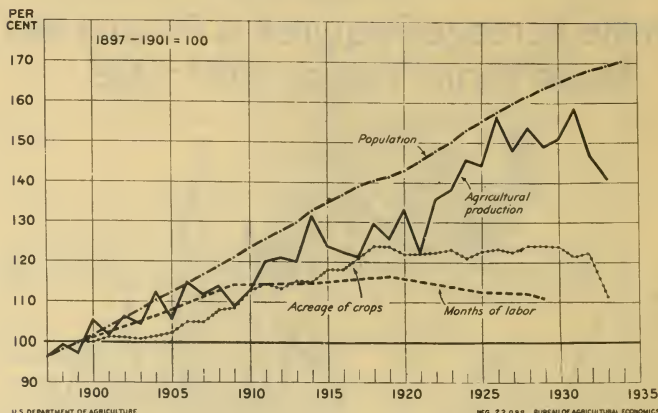


FIGURE 13 - AGRICULTURAL PRODUCTION FROM 1926 TO 1931 WAS ABOUT 50 PERCENT GREATER THAN AT THE BEGINNING OF THE TWENTIETH CENTURY, CROP ACREAGE WAS NEARLY 25 PERCENT GREATER, AND QUANTITY OF LABOR EMPLOYED IN AGRICULTURE IN 1929 WAS 10 TO 12 PERCENT GREATER. PRODUCTION PER ACRE, THEREFORE, INCREASED ABOUT 20 PERCENT, AND PRODUCTION PER MAN ABOUT 35 PERCENT. MOST OF THIS INCREASE OCCURRED AFTER THE WAR. THE TREND OF PRODUCTION HAS BEEN RAPIDLY DOWNWARD SINCE 1931, OWING LARGELY TO EXCEPTIONAL DROUGHT. THE BASE PERIOD 1897-1901 WAS OPULENT IN THE RELATION OF PRODUCTION TO POPULATION, ABOUT ONE-FOURTH OF THE PRODUCTION BEING EXPORTED; AS COMPARED WITH ONE-EIGHTH AT PRESENT. CONSUMPTION PER CAPITA HAS BEEN WELL MAINTAINED, EXCEPT DURING THE WAR YEARS, WHEN THE DECLINE IN CONSUMPTION WAS ATTRIBUTABLE MOSTLY TO FOODS, AND DURING THE DEPRESSION YEARS, WHEN THE DECLINE IS LARGELY ATTRIBUTABLE TO NON-FOODS - COTTON AND FLAX PARTICULARLY.

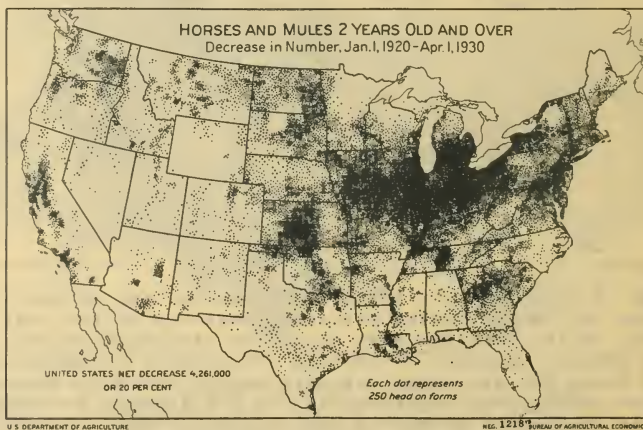


FIGURE 14 - THIS MAP SHOWS ONLY THE DECREASE IN MATURE HORSES AND MULES BETWEEN THE CENSUS YEARS 1920 AND 1930. THE DECREASE WAS PROPORTIONATELY MUCH GREATER - 53 PERCENT - IN YOUNG STOCK. THE AREA OF CROP LAND RELEASED BY THE DECLINE IN ALL HORSES AND MULES PROBABLY EXCEEDED 20,000,000 ACRES DURING THIS DECADE, 1920-1930, AND NOW AMOUNTS IN ALL FULLY TO 35,000,000 ACRES, WHEN CALCULATED FROM THE EARLIER PEAK IN NUMBERS IN EACH STATE. MOST OF THESE 35,000,000 ACRES ARE NOW USED TO FEED MEAT AND MILK ANIMALS.

Less Productive Compared with More Productive Crops Per Acre and Meat and Milk Animals Per Unit of Feed Consumed. Percentage Change in Acreage or Number, 1900 to Date

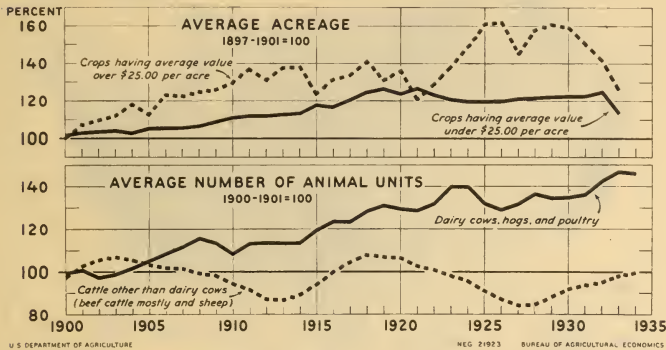


FIGURE 15 - THE ACREAGE OF CROPS HAVING A HIGH AVERAGE VALUE PER ACRE (OVER \$25 DURING THE PERIOD 1925-1929) INCREASED MORE RAPIDLY PRIOR TO THE DEPRESSION, THAN THAT OF CROPS HAVING A LOWER AVERAGE ACRE-VALUE. FROM 1921 TO 1926 THE INCREASE IN ACREAGE OF THE MORE VALUABLE CROPS WAS NOTABLE. LIKEWISE, THE NUMBER OF DAIRY COWS INCREASED NOTABLY WHILE THAT OF BEEF CATTLE, WHICH PRODUCE MUCH LESS HUMAN FOOD PER UNIT OF FEED CONSUMED HAS REMAINED ABOUT STATIONARY, OR DECLINED SLIGHTLY, AFTER ALLOWANCE IS MADE FOR THE CYCLE. THESE TRENDS TEND TO INCREASE PRODUCTION PER ACRE, BUT DURING THE DEPRESSION, AND WITH THE DEVELOPMENT OF THE AGRICULTURAL ADJUSTMENT ADMINISTRATION PROGRAM, THE TREND HAS BEEN TOWARD THE LESS INTENSIVE USE OF THE LAND.

CORN, WHEAT, OATS, COTTON, AND HAY, YIELD PER ACRE FOR UNITED STATES 5-Year Moving Average, 1885-1931

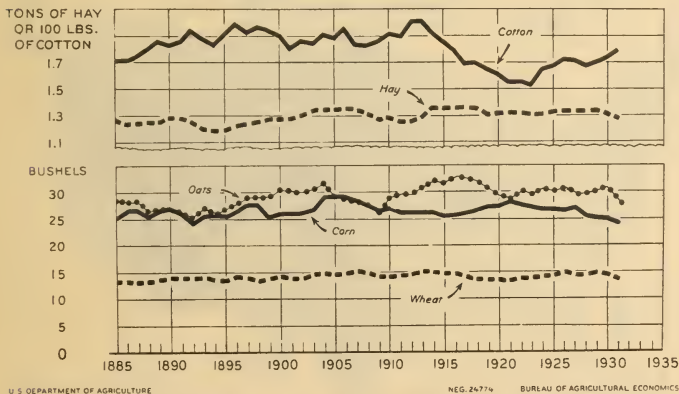


FIGURE 16 - THE ACRE-YIELDS OF WHEAT IN THE UNITED STATES AS A WHOLE HAVE CHANGED LITTLE FOR 40 YEARS, EXCEPT FOR AN OCCASIONAL ABNORMAL YEAR. IT IS WORTH NOTING, HOWEVER, THAT DUE TO DROUGHT IN 1933, THE ACRE-YIELDS WERE LOWER THAN IN ANY YEAR SINCE 1890. THE ACRE-YIELDS OF CORN HAVE TRENDED DOWNWARD DURING THE LAST DECADE. DURING THE LAST FIVE YEARS ACRE-YIELDS AVERAGED LOWER THAN IN ANY PRECEDING FIVE YEARS SINCE THE CIVIL WAR, THOUGH THEY WERE ALMOST AS LOW IN 1890-1894. THE ACRE-YIELDS OF OATS HAVE BEEN FAIRLY WELL MAINTAINED, BUT IN 1933 WERE THE LOWEST ON RECORD. THE ACRE-YIELDS OF COTTON TRENDED DOWNWARD AS THE BOLL WEEVIL EXTENDED ITS RAVAGES, BUT IN 1931 AND 1933 WERE NOTABLY HIGH. THE AVERAGE ACRE-YIELD OF HAY HAS INCREASED LARGELY BECAUSE OF SHIFTS FROM THE LESS PRODUCTIVE GRASSES TO THE MORE PRODUCTIVE LEGUMES. IN 1930, 1931, AND 1933, HOWEVER, YIELDS WERE LOW.

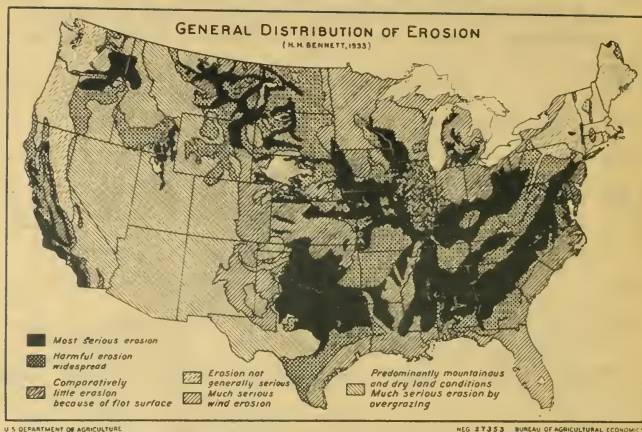


FIGURE 17 - THE REGIONS OF MOST SERIOUS EROSION ARE THE PIEDMONT, WHICH EXTENDS SOUTHWESTERLY FROM NEW YORK CITY TO CENTRAL ALABAMA; THE UPPER COASTAL PLAIN OF GEORGIA, ALABAMA, MISSISSIPPI, WESTERN TENNESSEE AND OF NORTHEASTERN TEXAS; MUCH OF THE OHIO RIVER VALLEY AND OF THE LOWER MISSISSIPPI AND LOWER MISSOURI RIVER VALLEYS, THE PRAIRIES OF TEXAS AND OKLAHOMA, THE PALOUSE-WALLA WALLA DISTRICTS IN THE PACIFIC NORTHWEST, AND THE HILL SLOPES IN CALIFORNIA. EROSION IS ALSO WIDESPREAD IN THE APPALACHIAN MOUNTAINS FROM PENNSYLVANIA SOUTH AND IN THE OZARKS OF MISSOURI AND ARKANSAS.

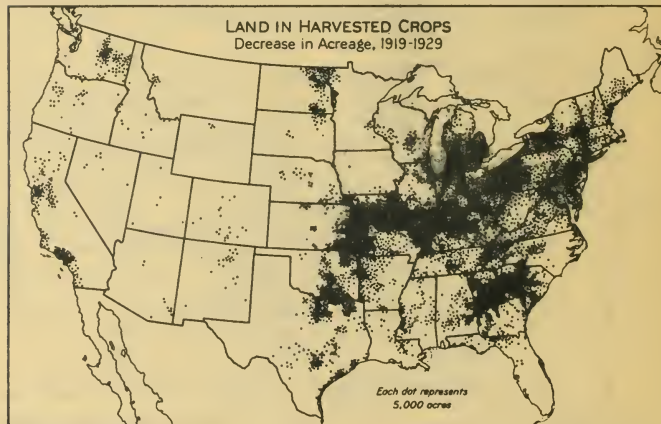
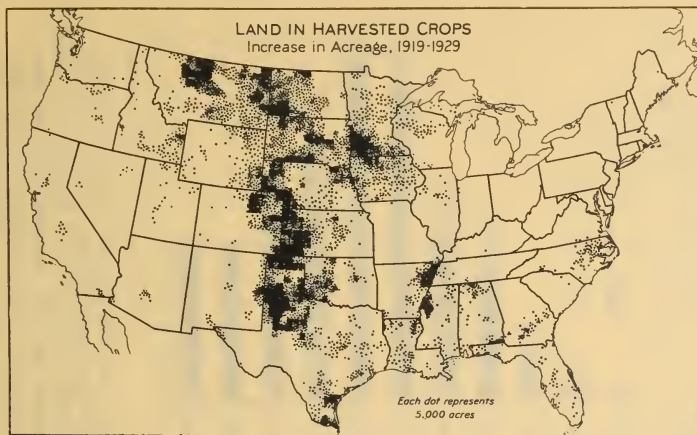


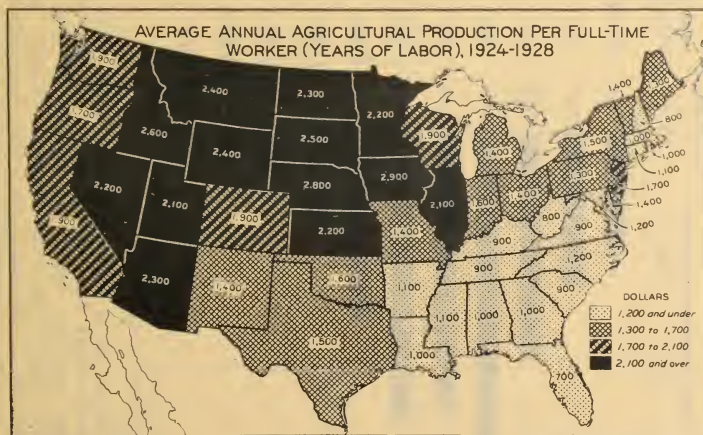
FIGURE 18 - A DECREASE IN ACREAGE OF CROPS OCCURRED BETWEEN 1919 AND 1929 IN MOST OF THE ORIGINALLY FORESTED PORTION OF THE UNITED STATES. THE DECREASE IN THE 1,940 COUNTIES REPORTING A DECREASE EXCEEDED 32,000,000 ACRES. THE OUTSTANDING DECREASE WAS IN THE PIEDMONT OF GEORGIA AND SOUTH CAROLINA, AND IN A BELT EXTENDING FROM SOUTHERN NEW ENGLAND ACROSS NEW YORK, SOUTHERN MICHIGAN, OHIO, SOUTHERN INDIANA, SOUTHERN ILLINOIS, AND MOST OF KENTUCKY AND MISSOURI, TO EASTERN OKLAHOMA AND CENTRAL TEXAS. PART OF THIS LAND WAS USED FOR PASTURE, PART LAY IDLE, AND PART WAS GROWING UP TO BRUSH. THE FARMS IN THESE AREAS GENERALLY ARE SMALL, AND THE SOILS ARE POOR OR FAIR, BUT SOME ARE GOOD. EROSION WAS A LARGE FACTOR IN THE DECLINE IN CROP ACREAGE IN THE PIEDMONT, OHIO VALLEY, AND MISSOURI AREAS.



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FIGURE 19 - THE INCREASE IN CRDP AREA BETWEEN 1919 AND 1929 OCCURRED MOSTLY IN THE SEMI-ARID PORTION OF THE GREAT PLAINS REGION, WHERE THE TRACTOR, COMBINE, AND OTHER LABDR-SAVING MACHINERY MADE IT POSSIBLE TO GRDW CRAIN ON THE LEVEL LAND PROFITABLY AT THE PRICES THEN EXISTING. A NOTABLE INCREASE OCCURRED ALSO IN SOUTHWESTERN MINNESOTA AND IN THE MISSISSIPPI RIVER BOTTOMS OF MISSISSIPPI AND NORTHEASTERN ARKANSAS. IN BOTH THESE AREAS MUCH LAND HAD BEEN DRAINED, BUT MOST OF THE MINNESOTA GAIN WAS BECAUSE OF A SEVERE DROUGHT IN 1919. THE INCREASE IN THE 1,130 COUNTIES IN THE UNITED STATES REPORTING AN INCREASE DURING THE DECADE EXCEEDED 30,000,000 ACRES.

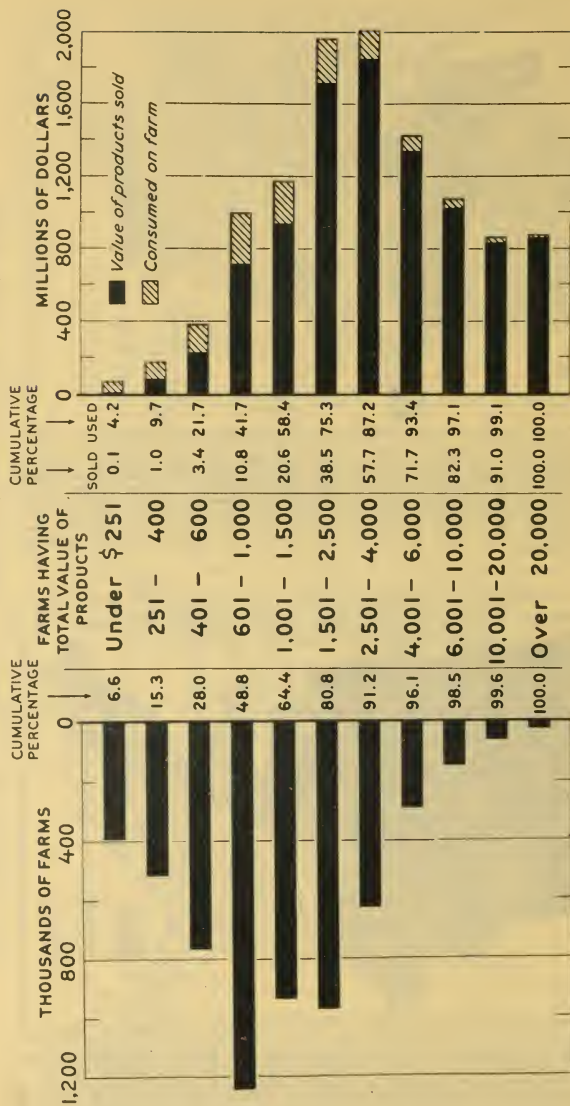


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FIGURE 20 - SOUTH OF THE POTOMAC AND OHIO RIVERS THE AVERAGE VALUE OF FARM PRODUCTS SOLD OR CONSUMED BY THE FARM FAMILY WAS LESS THAN \$1,000 DURING THE YEARS 1924-1928. IN MOST OF THESE STATES THERE WERE LESS THAN 2 HORSES OR MULES PER WORKER, AS COMPARED WITH 10 IN IOWA. IN GENERAL, THE VALUE OF AGRICULTURAL PRODUCTION INCREASES WITH THE AMOUNT OF POWER AVAILABLE PER WORKER, EACH HORSE OR MULE BEING ASSOCIATED WITH AN INCREASE IN PRODUCTION OF \$100 TO \$200, BUT THE AMOUNT OF POWER PER WORKER VARIES NOTABLY WITH THE FERTILITY AND LAY OF THE LAND AND WITH THE CROPS GROWN. IN THE COTTON BELT THE LACK OF A SUCCESSFUL MECHANICAL COTTON PICKER, AS WELL AS GENERALLY POOR SOIL, LIMITS PRODUCTION PER WORKER.

ESTIMATED VALUE OF PRODUCTS SOLD FROM FARMS CLASSIFIED INTO VALUE OF PRODUCTS GROUPS, UNITED STATES, 1929



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FIGURE 21 - IN THE CENSUS YEAR 1929 OVER ONE-FOURTH OF THE FARMS IN THE NATION PRODUCED LESS THAN \$600 WORTH OF PRODUCTS, INCLUDING THE PRODUCTS OF THE FARM USED BY THE FAMILY. BUT THIS FOURTH OF THE FARMS CONTRIBUTED LESS THAN 4 PERCENT OF THE FARM PRODUCTS SOLD OR TRADED. NEARLY HALF OF THE FARMS IN 1929 PRODUCED LESS THAN \$1,000 WORTH OF PRODUCTS, BUT THIS LEAST PRODUCTIVE HALF OF THE FARMS CONTRIBUTED ONLY ABOUT 11 PERCENT OF THE COMMERCIAL PRODUCTION OF THE NATION. UNDOUBTEDLY THE OTHER HALF, THE MORE PRODUCTIVE FARMS, COULD WITHIN A FEW YEARS, READILY PRODUCE THIS 11 PERCENT. HALF THE FARMS OF THE NATION ARE NOT REALLY NEEDED TO PROVIDE THE CITY AND OTHER NON-FARM PEOPLE WITH FOOD AND FIBRES. BUT THE LESS PRODUCTIVE HALF OF THE FARMS ARE SUPPLYING MOST OF THE CHILDREN THAT MIGRATE TO THE CITIES, AND THE CITIES WILL SOON NEED PEOPLE AS WELL AS FOOD.



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